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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 24, 1973
5:24 p.m. CDT

PARTICIPANTS:

Don Puddy - Flight Director

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PAO All right, we'll start right off with Don, and then we'll take your questions. Don Puddy, the Flight Director.

PUDDY Okay, well, we're still playing the thermal balance game, as expected. We are also in our last depressurization cycle. Right now we are at 0.8, planning to go down to 0.1 and from that point we'll be moving up to 5 psi at just prior to the crew sampling period on day 2. There really are no new problems to report to you. So, let's just open it up for questions and go from there.

QUERY I guess I got a stream of them, Don. First of all, the coolant loops, I understand, are back down to around to about 34 one or two, or whatever. What is that?

PUDDY Okay, what we've been doing on that today, we have noticed a general decrease in what we call the SUS temp, which we've talked to you about before. Generally it's dropping about a PCM count, or about a half a degree in temperature every 14 hours. And so what we do is, we go into what we call a temperature reset routine and we're in the process of doing that right now. We have our baseline pitch, when we started out today was around 50 degrees. We pitched down to 45 degrees in order to condition ourselves electrically for the subsequent maneuver. And around 5:40 this evening, we will be pitching up to an attitude of 68 degrees pitchout. We will maintain ourselves in that particular attitude for two revolutions and around 9:00 this evening we will be pitching back down to a baseline of 45 degrees. Our intent on this particular parameter is to insure that we put ourselves in a posture by tomorrow, such that we do not have to get into this reset routine. In other words, during the shift this evening and during the evening hours, we will go through as many of these maneuvers as are required to insure that during the rendezvous day, which, as yoy're well aware is quite a long day. We do not have to make any maneuvers, particularly to maintain this temperature within the relm we'd like to have it, which is around 34.5,34.7.

QUERY What about temperatures in other areas of the workshop? Have we seen any, really, decrease or increase. Are they still going up? I know they're stablized, but increasing, I think is ...

PUDDY We have been at a little higher pitch angle most of the day. Primarily because we have experienced a little drift in the RATE GYROs, and that drift has tended to cause us to pitch up, as opposed to pitching down, so

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while we started out this morning at around 47 degrees, we gradually moved on up to 52 or 53 degrees before we went into this last correction maneuver. So, in general you can say that these temperatures have more or less stablized and maybe dropped off a degree. However, we're just playing in a boundary now, where you can say for a given period of time they're steady, and may be decreasing slightly, and at other attitudes they're steady and increasing slightly. I think we re going to be in that posture until we actually get some sort of a sail, that you've all been briefed on, deployed. It's a very delicate balance between this coolant loop temperature, the ATM instrumentation temperatures, and of course the overall habitation area, food, film, and medical provisions.

QUERY One other thing. You all have been playing with this thing, now, ninth day today, Is that it?

PUDDY I've lost track, Whatever you say.

QUERY Whatever it is. And there was no intention this early in the mission to go this long. They considered, you know, I think, be a 5 day slip to begin with, you know, the possibilities of that. Were you all ready to start this or have you really learning a heck of a lot about that craft and how to maneuver it. As much as you're doing, you're changing several times every day and all. Did you all just have to regroup and start learning all over or were you ready for it?

PUDDY Well, we like to say that we're ready for any contingency. And that's the reason we go through a rather extensive --

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PUDDY Well, we like to say that we are ready for any contingency. And that's reason we go through a rather extensive period prior to the start of any mission or simulation period. To practice these things, as you are well aware, this is more of a long term problem than we can generally simulate in the Control Center. So, no, I cannot say we were completely ready for this type of total spacecraft management. I will say, however, that during our simulations we had treated a lot of the type of problems that we are experiencing now to some degree or another. I think, however, that the area that we are in right now we have had a very steep learning curve. And we are continuing to learn because generally, as you are well aware, the attitudes that we expect to find ourselves in are solar inertial or ZLV. And when you start talking about the areas where we are pitched up 47 degrees or pitched up 70 degrees, not only were we not totally prepared to cope with them, but none of the premission predictions were done to simulate these particular attitudes. They have been designed, all the components and everything had been designed around a certain sigma band around what we expected to get into as far as the nominal attitudes. So, it's been a steep learning curve. I think after the first 3 or 4 days, we had a pretty good feel for just exactly what effect and action we took would have upon the spacecraft. But, we also, I think, have seen some very long term thermal effects start to take place say 4 or 5 days after we got in there that we didn't see the first 3 days. This SUS temperature being one of them. I think since it has a very large mass, it took a long time for us to see that one. And it is just now gradually - We are still learning on that one.

PAO Any more questions?

QUERY When they are working on the Skylab, or working from the command service module, how are they going to control the counter forces? How are they going to keep from putting something into rotation?

PUDDY Well, of course, we are in a attitude control mode as far as the workshop itself is concerned, where we are essentially deadbanding. So it will maintain its attitude. As far as the CSM is concerned, the commander has translational control capability to maintain his position and the device that you are talking about, the device that they're using, possibly to deploy the wing. That device is designed such that it - I guess that you could call it a shepherds hook, where you can both push and pull with that particular device so that you do not impart Delta

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motions to either spacecraft.

PAO Peter Oakes.

QUERY When you're going to get around to push-out this parasol, do you know exactly what the commander and the pilot are going to be doing?

PUDDY No, and I had that information and I was just talking to Milt about that a minute ago. I did not bring that with me. We may have it here in just a few minutes, just exactly who is doing what when. There - Certain of the crewmen have practiced certain of these events and I don't want to guess on that one. Let me wait until we get that information. But, we can provide that to you. No problem.

QUERY In the flight plan, it says something about preparation for TV if required. What kind of TV would that be, and what would the requirement be that would involve the TV?

PUDDY I think that would be strictly be a documentary TV of the particular action. I'm sure it would be of interest to the American public if they could view it.

QUERY Would that be real time live, or would it be taped and dumped down later?

PUDDY Milt, do you have a flight plan for that particular day? I don't. It looks like, according to the flight plan here, that it is, it is not planned to be brought back real time. So if they have it, it would be recorded, subsequently dumped and then provided.

QUERY Is the parasol on the way to the Cape now, or is it - -

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PUDDY - - or is subsequently dumped and then provided.

QUERY Is the parasol on the way to the Cape now, or is it still here?

PUDDY As far as I know, it's on its way to the Cape.

SPEAKER Not yet.

PUDDY Not yet?

SPEAKER It hasn't departed yet.

PUDDY Okay, sorry about that.

QUERY On day 2, when the astronauts enter this 125 degree temperature, what will they be wearing? How will they keep cool?

PUDDY As far as I know - Deke went that rather extensively, I believe this afternoon. They are loading the parasol on the plane now? Okay, I wasn't too far off. As far as I know, right now the last word I had on that was it is going to be shirt sleeves.

PAO Jim.

QUERY They are going to have an awful lot to do in heat that high and wearing masks besides. Now are you planning rest points along the way? Are you - is there a time that you are going to try to aim to have all this done in under these dreadfully warm conditions? How is that going to work?

PUDDY I think, the timelines that I've seen indicate that you can - probably after you've gone through the AM MDA area, which by the way is not hot, and that will take a considerable period of time to do. Once you have got that activation pretty well squared away, the actual deployment of the sail itself is not that long an operation. We are talking somewhere in the order of an hour, an hour and a half maximum. It's warm. I certainly won't argue that, it's warm but, they're from Houston.

PAO Peter Mosa.

QUERY I seem to remember way back hearing that one of the first things the crew would do on getting into the workshop, would be to switch on some sort of fans, heat exchange units. Are they still going to do that?

PUDDY Yes they are.

QUERY What is likely to be the effect? Will that bring bring the temperature down significantly or just move it around a bit?

PUDDY I don't think that - I don't think we are going to see a marked decrease in temperature in the spacecraft until several hours after we have deployed the sail. You've got a lot of mass there, and if you're circu-

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lating hot air, you are still going to come out with hot air. So it's going to take a while after we get the shield out before - and I think an estimate on that has been some where around 36 or 48 hours before you can actually expect those temperatures to reach what we would call comfortable temperatures.

QUERY You said 36 to 48. I'm almost sure it was you who said earlier 12 to 24, maybe 36. It seems to be increasing. Has there been a change or is that just kind of a better figure now?

PUDDY No, I don't think I have ever quoted a temperature stabilization there. The figures that I have here are some that were quoted to me a day or so ago that the Marshall people had estimated and since most of the shields essentially have the same thermal characteristics - feel those figures are still fairly valid.

QUERY Can you tell us how the humidity is running and if there is a motion of air, if the air is in motion?

PUDDY No, the air right now is not in motion except for the amount that we will have as far as the gas flow from the pressurization sequence itself. You will get some motion there, but no the air is not in motion. Of course, when we - since we are dropping the spacecraft pressure down to a tenth of a psi, it is going to be dry, very dry.

QUERY It might be a silly question, but what kind of an airplane takes this parasol to Kennedy Space Center? And do you have any kind of special delivery or how do you bring it over there?

SPEAKER I think the parasol is going on a Lear jet. The parasol on a Lear jet and some other equipment and a T-38.

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PUDDY - Yes, the parasol, the Lear jet and some other equipment in a T-38. Two aircraft.

PUDDY If you want me to, I'll be more than happy to say a few words about the flight plan tomorrow, if that's of some interest. We, of course, are expecting to have a lift-off at 800 our time, 900 eastern daylight time. The nominal sequence is much the same as a standard M=5 rendezvous profile that I'm sure most of you are familar with. We expect to insert into an 84 by 190 orbit, followed shortly thereafter by separation, and then go into our nominal maneuver sequence. The workshop, actually will not be maneuvering at all until after the terminal phase maneuver. Excuse me, right before the terminal phase maneuver. We will be maneuvering from our attitude of a pitch of 45 degrees down to solar inertial. And we're doing this so that the crew can use the VHF ranging equipment and the tracking lights that we have to get their final marks for the last mid-course corrections. Shortly after they have completed those particular maneuvers, we will be going to essentially our flyaround attitude, which is again a pitchup of 45 degrees. And we will be holding that particular attitude for both the flyaround activities and for the SEVA. The exact times of those maneuvers, if you'd like to have them, based on our prelilminary plan right now, and this may be refined somewhat during the night. The maneuver to solar inertial will occur at 6 hours and 22 minutes into the sequence. Probably be uplinked over Goldstone. The maneuver to our flyaround attitude will occur at 7 hours and 37 minutes, and all the maneuvers that we are conducting on the workshop this particular day, will be 10 minute maneuvers. In other words, we loaded a factor into the computer that says, once we give you the command, execute the maneuver, take 10 minutes to get to the new attitude. After the fly-around over the states, and by the way, we should have some TV during that particular maneuver, that last one I talked to you about at 7 hours and 37 minutes, that is over Guam, and we are expecting some real time TV there. We will be conducting the flyaround and we should have real time TV from the states. At around 8 hours and 15 minutes we expect to, right before sunset, we expect to go ahead and perform what we call a soft docking, which is just the capture latches, and we're doing this so that the crew can go ahead and have an evening meal and go ahead and make preparations for the SEVA activity. As far as the SEVA activity is concerned, depending on just exactly what their illumination requirements are, we may be required to maneuver the spacecraft. Our flyaround attitude is offset slightly

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in fact it's offset about 28 degrees in roll to provide the best illumination, and according to which solar array it looks like they would like to view that area best on. They may request a Delta maneuver of another 20 degrees. In other words, we could be rolled off as much as 48 degrees or we could be rolled back to essentially 8 degrees from what we call roll 0. And that maneuver, if it is executed, would be accomplished somewhere around 9 hours and 42 minutes after liftoff. We will be giving a GO/NO GO for the SEVA at around 10 hours into the sequence, and right after the darkness period, which ends at around 10:34. We will begin the SEVA, and of course that will last for about one daylight period. Following the SEVA activity, and prior to the next sunset, which occurs at around 11:32, we will --

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PUDDY - lapsed for one daylight period. Following the SEVA activity, and prior to the next sunset, which occurs at around 11:32, we will dock and do the minimum activities that we have to in order to get the crew ready for a nights rest. They will have had a very long day. And that's about it, I think, as far as the general plan.

QUERY Don, you said minimal time, you know, lets see, about one, two, looks like about 5 hours or so before they sleep after they redock. Is that minimal time?

PUDDY That's about the minimum length of time where they can actually go through the debriefing, get out of the suits, get the spacecraft squared away, put all the tools up, and get into some posture for sleep. I think we're talking about something like a 16-1/2 - 17 hour crew day. Long day.

QUERY That SEVA is to try to get the solar panel out?

PUDDY That SEVA is designed primarily for that. It is not intended - may be to clear any debris, say there is some debris around one of the SALs or something of this nature. It's a kind of a general spacecraft police-up. It is not intended, however to deploy any sails or anything of this nature.

QUERY There will be an attempt to get out the workshop solar panel on that?

PUDDY There certainly will, if it looks like they can do it.

QUERY And there will be no TV on that SEVA?

PUDDY No, that particular SEVA occurs essentially outside a ground station contact, so there's not much possibility there.

QUERY Let's suppose that for some reason or another that the SEVA ends up taking up more time than originally alloted. How - What is the maximum time you can allow for SEVA?

PUDDY Well I think the primary desire there is not to put the crew through the additional effort of trying to keep, essentially station keep with the workshop during the night time frame. And as far as whether or not that would be extended and give them another daylight pass at it, I think is going to have to be based on a real time situation and their assessment. But, in general, right now, it's not planned to extend that over the one daylight pass. But, you know, the way this has got to be played is real time.

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QUERY What I had in mind there, was any equipment limitations, not management type decisions.

PUDDY Equipment limitations?

QUERY Whether - Can they stay in the spacesuit mode, hatch open, so forth for 3 hours, 4 hours? Is there any kind of limitation there? Equipment wise?

PUDDY No, if you will remember, there was a the original flight plan that we had there, originally had two SEVAs on that particular day, and the primary reason for backing off of that was, it was just too long a day with that type of activity. So I know of no constraints if in real time it looked like we could actually accomplish something. I think the primary consideration would be the crew day.

PAO I might mention one other problem before we close out. You may hear about it during the evening. It's one that we have just started to take a look at. We have had a - I shouldn't say it's a problem, it's a - right now it's a what we call a funny associated with one of the regulators on one of the CBRMs, battery 17, and basically what it's doing right now, it's changing its characteristics, sometimes it's charging the battery not as much as we would like to have it, and at other times, it's allowing the battery to discharge more than we would like. And we are looking into that this evening and right now it's not expected to be any impact at all.

PUDDY Okay. We got some information here. The T-38 departed about 5:20 central daylight time for the KSC skid strip. The Lear jet is taxiing to the runway right now.

QUERY What's the - This is probably an unfair question, but I'm going to ask it anyhow. What's the worst that this funny could mean?

PUDDY The worst case that you could run into, if this should turn out to be a total failure of that regulator, would be the loss of 1/18 of your power capability. As far as ATM power is concerned, or about 150 watts. However, it is certainly not exibiting the characteristics that indicate that we're any near a total failure. We think this could very easily be associated with some of the thermal characteristics that we have seen in our most recent attitude. We may have cooled it down too much. Also there are some redundant circuitry that we can ground command to switch, and we're just taking a look at it. I just wanted to let you know that that is being looked at. But right now, we're certainly not concerned about it. But I have given you the absolute worst that could happen. Right now, we're not anywhere near that. Its on line, everythings working.

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QUERY Just follow to make sure I understand. Are you talking about that you would lose, the absolute worst 1/18 of the power capability. Are you talking strickly of use in the ATM or are you talking about 1/18 of the overall cluster of power?

PUDDY 1/18 of that associated with the ATM, but the ATM power, right now, is the only power we have.

PAO Okay, no more questions. Thanks a lot. Thank you, Don.

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SKYLAB NEWS CENTER
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Change of Shift Briefing
Johnson Space Center
May 23, 1973
5:09 p.m. CDT

PARTICIPANTS:

Milt Windler, Flight Director
George Hardy, MSFC

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PAO Okay, let's get started, please. We have Flight Director Milton Windler and Mr. George Hardy from the Marshall Space Flight Center. Will you give us a summary of your shift, Milt, please?

WINDLER We've had a relatively quiet day, as I think Neil explained to you this morning. We had put the spacecraft in an attitude to sort of let it thermally stabilize. We have adjusted it a couple of times during the day. Essentially we're trying maintain a 48 degree pitch and - roll zero, and of course, the yaw zero. Towards the end of the day, essentially the temperatures continued to rise in the cabin. I think the suit umbilical system temperatures have been stable all day right around 35 degrees - 34.7. And the cabin temperatures, however, have gradually risen - I believe they were probably around 126 this morning, I believe they're 128 or so now. We have been evaluating the constraints on the food and film as well as the other hardware - you might call them objects. You've already gotten a briefing on the food, I believe, and essentially we've agreed that the food can probably be satisfactory up to 130 degrees. The film is still undergoing a review, although as you're probably well aware, most of the film items, I think we mentioned this yesterday - the ones that are very critical are being replaced and being stored on the command module for transfer to the Skylab when the crew gets there. We did try a - have just executed a maneuver, and it's too early to tell much about it, but we are now pitching up to 65 degrees, and plan to stay there for two sunlight periods. And the reason for this is twofold. One, we think that the higher temperature - I mean the higher angle will reduce, of course, the effect of the Sun on the workshop, allow us to radiate and cool that down, and also the geometry is such that it does provide some heat into the area - the forward end of the vehicle where this suit umbilical system is located. So, we think it will help both of those. Of course, it's hard on the power system and that's the main reason for not going longer than two revolutions. And then we expect after that two Sun passes through - at that attitude - to come back down to 45, which was our attitude yesterday, if you'll recall, and hold that for five daylight passes, which will allow the batteries to come back to a fully-charged state. Other than that, I think the other systems on the spacecraft are pretty well behaving quite nicely. And we are just trying to manage the thermal condition and wait for the crew to get there.

PAO Mr. Hardy.

HARDY I don't have anything to add. I think Milt covered very well the status we're in right now.

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PAO Okay, Bruce Hicks.

QUERY Milt, I have several questions. First of all, the maneuver - the 65 degrees pitch - you're going to you say, warm up back there where the coolant loops are, but I thought 34.7 was what you wanted. And I understand that's what you're at, so are you just trying to stabilize it more or do you really want it higher?

WINDLER Well, we'd be very happy if we were assured that it wouldn't go below 34.7, but as you recall from yesterday, we made a lot of maneuvers, and it's not easy to tell which one had what affect on it. It depends a lot on the lag, in other words, if it's a lag of 10 hours then this maneuver was the one that did us good. If it was a 14-hour lag, then it was another one. And I guess we are - since we do have this opportunity to do - to kill two birds with one stone, to affect both systems in a positive manner, well that's the reason for choosing the attitude. You're right though, if the temperature stayed where it is, we'd be very happy. However, we're trying to - while we're cooling off the back end of the vehicle, we're also trying to put a little bit more heat into the front end where that suit umbilical loop is.

QUERY George, what is the third device going to be taken for the backup - third sunshade?

HARDY I'm not - you fellows have to excuse me, I have a little cold here, can't talk very well. I'm not sure exactly. The design review was in Huntsville, today, I think most of you know. Representatives from JSC were there and that review was still going on about an hour ago when I checked in, so I can't comment right now just exactly what that will be. We'll still have a status report coming from Mr. Schneider so maybe that will - -

QUERY Do you have any idea if the inflatable device has been readied yet?

HARDY Well, the inflatable device was being tested last night, was being tested again today, and they were proceeding to build flight hardware for the inflatable device in case it was selected as one of the shields.

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HARDY - they were being tested again today and they were proceeding to build flight hardware for the inflatable device in case it was selected as one of the shields.

PAO Arthur Hill.

QUERY Milt, on this thermal management business - Are you all operating from a calculated kind of approach or are you having to work this thing more or less as an empirical problem? I guess I'm asking, is your thermal management a science or an art?

WINDLER Well, it's both, of course. There's a lot of art to it. There's a lot of best engineering judgement based on experience. A lot of people we're working with at Marshall, and George knows who they are better than I do and their backgrounds, but they've had a lot of experience in this field and we are plowing new ground here, so, we - we're learning as we go and we're using the past year's experience as well as what data is available to us from where we are right now. But there is still a lot of judgement in it.

QUERY Okay, I wonder if anybody could tell me how things look as far as getting items stowed on board the Apollo spacecraft tomorrow? Does it look like you're going to be putting things on as late as 12 hours before launch, or will you have it all buttoned up some time before then? What does it look like?

HARDY Most of the hardware that has been identified or is being identified even today is being shipped to the Cape tomorrow morning or tomorrow afternoon. We hope to have an orderly bench review and stowage of the command and service module. However, if there are one or two items that come on late, we understand that the Cape could accommodate those as late as 10 to 12 hours.

QUERY What is - -

HARDY Well, I think the majority of the items will be there much earlier than that. In fact, as I mentioned, the several candidates of sunshields or sunshades flight hardware is being delivered to the Cape and even those that may not get selected as flight items.

QUERY ... questions. First of all, what is the crew going to wear when they enter the workshop? Are they going to wear shirtsleeves or some kind of a cooling garment?

WINDLER The only thing that I know of that they are going to wear is a mask, which, I believe, is primarily a carbon absorption - charcoal absorption-type. I don't think there's any plans - I'm not aware of any plans that they are wearing any special garments.

HARDY - they'll wear the constant-wear garment

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or some lightweight shirtsleeve garment. They will wear, I believe, special gloves in case of any - protect against hot spots and they will wear the special masks that, I believe, Dr. Hawkins talked about a day or so ago.

QUERY I may have missed this before, but, I understood you were running tests with the - with various temperatures with the gassing materials and 2 or 3 days ago the tests were still negative. But at the same time, I understand you are still keeping - pressurizing and depressurizing the spacecraft, so, I gather you still suspect that something may be there. What is the current status on that?

WINDLER Yes, we're continuing with that, as we agreed several days ago, now. I've forgotten how many, but we're coming up to the last cycle at 2 and we'll drop it again and then pop it back up to 5. And I think we did talk about this before and you know it - there's some people whose analysis indicates that there may not be any, and there are other people that suspect that there could be some, and as a precautionary measure, we're trying to dilute it down to a level that we are sure can be handled by the onboard systems - and we're doing that as a common precaution.

QUERY Do you have any result on the ground - on the lab test - the heating test of the material?

HARDY I'm not familiar with the latest results of those tests. I do know they are being conducted but I'm not familiar with that.

WINDLER As you pointed out earlier, they were negative, I believe.

QUERY Could I just come back a minute to these liquid cooling garments? The understanding I had a few days ago was that they would be flown in the SL-2, anyway, with the option of using them. When the - -

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SPEAKER A few days ago, it was that they would be flown in the SL-2 anyway, with the option of using them after real time assessment of what the temperature was inside the workshop. Are you familar with that?

WINDLER They always plan to be flown, and, of course, they could wear them if they chose. I guess I don't really know - have any background on that.

QUERY If by chance we slipped another 5 days by Friday, can you really, safely, keep everything going up there as you are now, or will you just be holding the baby together a little bit longer, you know? You seem to be playing with it a whole lot.

WINDLER Yes, we are, in a way, and in other ways, we're not. I think the control center is considerably more calmer, or whatever you want to say, than it was the first couple of days. We understand what we're doing. The results of it, in all the areas, are a lot better than we did then. Maybe the TACS control of the attitude control system may be a good example there. I think we better understand how that responds, and are better able to use the TACS in a very optimum fashion to keep its usage at a minimum. So, we have those kinds of advantages, and I think that yes, we can keep the vehicle going for another 5 days if we have to. I'd like very much to see the temperatures level out again. We are below, though, the limits on the - as we understand them now, on these item. But nobody likes to subject them to any higher temperature than they can - than they have too.

QUERY In that regard has any decision been made about slipping it 5 days, or is it going to be day to day?

WINDLER I know of no decision to slip. He was asking a question about how we could handle it if that happened. Hypothetical question.

QUERY If you had to slip Friday, what would it be to, Saturday?

SPEAKER We have an opportunity Saturday, and I believe there's also one on Sunday, which I don't know how long it is, but it's probably in your press releases, I would assume.

QUERY Do you plan to do that if you have to, rather than 5 days? Day to day rather than 5 days?

HARDY As far as I'm concerned, I'm not personally aware of any serious discussion right now in that regard, but the capability does exist. I do know that Flight control people have been looking at the options that are available. And I have been advised that there

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are opportunities available on Saturday and Sunday, too. It would result in a longer time for rendezvous, but the opportunities are available on Saturday and Sunday.

Q QUERY I'd like to know whether you people have heard how long astronauts can work in 125-degree temperature to get that parasol deployed, if that's what they have to do? How long can they work without their mental faculties becoming a little dull?

WINDLER I can't answer that. I don't know the answer to that.

HARDY I don't know the answer to that either. I'm quite sure that the medical people, however, are aware of the temperatures that we're talking about, and I couldn't comment on it.

QUERY In that regard, Milt, maybe you could tell us - let's see, you're going to have the astronauts standing back behind the scientific airlock. What kind of temperature, now - if the astronaut were there now, what kind of temperature in the middle there, kind of, would he be subjected to?

WINDLER Well, that's subjective, and in my mind I really have the hope, the whole cabin area kind of at 125 or so degrees, along in that area, and, you know, different people can advance theories as to thermal lags, and heat transfer, and all that, but I --

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WINDLER - 25 or so degrees along in that area. And you know different people can advance theories as to - with thermal lags and heat transfer and all that but - I just figure that that's about the environment in there.

PAO Louis Alexander.

WINDLER I don't think there's very much difference in the temperatures up at that point - you're talking about the fact that it's not - well the food is stored at - an area not too far away from there for example.

QUERY Being a hundred and - -

WINDLER We think it's about 127 or 28 along in there.

QUERY Well in the workshop itself do you happen to recall - are all those sensors off-scale or do you happen to recall a temperature range just in the workshop now?

WINDLER No, they are not all off-scale - there's one that's 111 - is I think - -

HARDY Well that's right in the opposite side of the workshop is of course quite a bit cooler than the - the hot side - I don't recall right now what those temperatures are but I do believe that there are some that are - well they are numbered - they're under 100 degrees.

WINDLER Some of the ones that we've been using - the sensors we've been trying to use to control the roll that are off-scale at 120 of late today - have kind of popped back and forth between - I think - 118 I believe I saw on it one time - 119. And during the daytime it tends to go off-scale and during the darkside it'll come back on and it's been staying on a little bit longer each rev - I think the attitude is probably helping it slightly - you know we have been pitching back to our 50 degree - towards the 50 degree attitude that we're in. We're anxious to see what it's like when I get back over there.

QUERY I read that you had plenty of reserve for propellants and fuel and so on to maneuver the workshop but that you'd used about half of your reserve - what is the status now?

WINDLER It's about the same - I think you asked that question the other day - I think the flight plan didn't change a great deal - we're still operating at - I think we - instead of 25 it was 29 percent that we've used or something like that - but it's in the same order.

QUERY . . .

WINDLER Well, the flight plan changed - let's see - no I'm saying - I - we've used - we have I believe a little bit less reserve but the flight plan did change. I looked at that number this morning just because of your question

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yesterday and then I - during the day I've forgotten it again.

WINDLER We did? Okay. What did we say?

QUERY His question kind of tied into mine - and mine was going to presume that we - we never shout - but there was a problem with the Saturn - and my - perhaps if we had it - a 10 or a 15 or a 20-day hold or even longer based on the rate that you're using your propellants now - how long if you had to could you hold it up there right where it is?

WINDLER Well we could go that long - I don't know how much longer we can go - I believe we're still using it - say approximately 500 pounds a day - pound-seconds a day. And we must have around a 40,000 - - No - -

HARDY We have about 57,000 I believe right now.

WINDLER Right now, but I mean our original - I'm trying to think of how much we required - it was - we required around 40 or a little less - a little more. So, I guess that's for a number of days yet - must be about 20 or so - I'm running out though - I'd hate to have you put that number down but we can go the other 5 days or 10 days.

QUERY Thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 23, 1973
9:30 a.m. CDT

PARTICIPANTS:

Neil B. Hutchinson, Flight Director
Donald D. Arabian, Chief of the Test Division
John E. Riley, Public Affairs Officer

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PAO Okay. Let's get started with this chang-of-Shift Briefing. We're waiting for another participant, but we'll go ahead and get started. Flight Director Neil Hutchinson will give us a summary of the vehicle status over the night. And very shortly, we should have Don Arabian here, who's manager of the Program Operations Office of the Johnson Space Center, who can discuss the testing of the various mechanisms that we've been developing here. Neil, do you want to go ahead and give us a summary, please?

HUTCHINSON We had a very very quite night last night, no new anomalies. We did a couple of maneuvers to keep our thermal balance going. We did a 2-degree pitchup and a roll of minus-15 degrees. And that maneuver left us in the vacinity of a 45-degree pitchup angle and wings level. We've been pretty much holding our own on the temperatures in the water loop, which is, of course, the one that we're primarily protecting against. It's holding at about 34.7 or 34.9, right in that region, degrees Fahrenheit. We, at the beginning of my shift last night, started a third cycle, I believe it was the third cycle, on the purge where we're going up to 2 psi, using nitrogen, and then back down to 0.6 and back up to 2 psi. And ah - This time, when we were going up, we ran a check on the habitation valves; those are the vent valves that we use to dump the atmosphere overboard. There are four of them, a series parallel arrangement of valves. And last night, we did the pressurization with only one valve closed in each leg to make absolutely certain that we didn't have any leaks or anything, and that all went exactly according to Hoyle. It took just exactly my entire shift last night to get the cluster back up to 2, and this morning, about 7:45, we started another dump overboard to take it back down to 0.6. We did some momentum management last night. Did a reset this morning,and our momentum is all straight. The current temperatures inside the OWS are running, estimated now, using the thermal models at Marshall, somewhere in the neighborhood of a 125 degrees Fahrenheit. And we've been pretty much holding our own right there. Today, in store, we have just more of the same. And, as you know, we're getting ready to start the countdown at the Cape. I think we've pretty much homed in on our mission plan for the first about 5 days for the mission. We've got all of our alternate procedures fairly well straight and I think we're about to get this thing in high gear again. That's about all I have. It was a very quite night.

PAO Okay. Why don't we go ahead and take any questions you might have for Neil, so that he can get home and get some rest.

HUTCHINSON Well, I wouldn't miss this next thing for anything. I'm going to stay here and watch this. (Laughter).

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PAO You've seen Mr. Arabian before. Okay. We do have Don Arabian here with us now, the manager of the Program Operations Office here at the Johnson Space Center. And he, as I understand, is going to give us a run-down on the testing we've been doing here. Is that right, Don?

ARABIAN Yes. Also, describe what the parasol is all about and how it works, if they are not already aware of that. Has that been described to them yet?

PAO Not in any detail.

SPEAKER We could use it.

ARABIAN You could use it? Okay. That - -

PAO You want to use the blackboard, or would you rather do it up here first?

ARABIAN I'll probably use a combination of both.

PAO Okay.

ARABIAN And ah - First of all, let me just draw a sketch on the board so you can see what it looks like on the bird,;then I'll (garble) with a very crude model. I didn't have much more than 15 minutes to prepare a model, you know, so you can see how the thing works. But I'll describe that to you. And then any questions you have, you know, then we can talk about at that time. I'll draw the workshop.

PAO We have listeners at Kennedy Space Center, too, Don, so you might want to use words that you might not use with the just the drawing, here, more descriptive.

ARABIAN All right. Now, this is the OWS workshop. This is looking at what I would call the back end. And here is the front end, where the solar array panel is for the telescope. And the deployable wings, of course, I'm sure you've heard the problems with those, would be sticking out in a fashion like so. Now, there is a opening on, one on each side of the workshop, a square opening about 8 inches by 8 inches. And that square opening is used to expose instruments out into the atmosphere to look, I mean out into the environment, and make certain type scientific measurements. Well, the idea of our scheme is to go ahead and cover the portion of the workshop with this micrometeoroid panel that's missing, which is in this portion of the drawing. Now, our principle involves four booms that are telescopic. And they come to a common head. There are seven sections to the boom. Looking at the top view, there's a sheet that's 22 feet by 24 feet of special fabric that has properties to radiate and reflect heat. And it's a thin sheet of material that's attached to the corners of the poles in a fashion like so. And here is the fabric then. And we have a pole then coming out with the board. This pole then would appear like so and there would be the sheet of fabric you see sitting on top of the on top of the workshop, just on a pole. These are the ribs, then, the four ribs that support the fabric and holds it out flat.

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ARABIAN Now, in order to get the fabric out, it's much like, or similar to that what I would say is deploying an umbrella. Now let me go ahead and take the model. This is about 1 inch-to-the-foot scale. This would be the fabric, and this would be four poles, and they have freedom in essentially all directions. They are retained at the hub by a set of springs for each one, such that if you would let the poles go under zero-g, they would come up into a position, and this would be plainer then. Like I would - it would be like that. That's what would happen in zero-g. This is upside down now; this would come out with the vehicle. All right. Now in order to get it out of the vehicle, this is all folded up in a fashion like so, like one would do for an umbrella. Now the poles are all telescopic, except the center pole, such that I can take these poles and squeeze them all down into a box. And here is the box, and all this fabric is folded in the certain fashion; it goes right into the box, and I can just take these poles and then push them down in, such that I have a package that looks like so. That particular package, by the way, is the same case that the T027 experiment uses, and it interfaces with the airlock wall, in a fashion like so. Just clamps right up. All right. But these poles, then, are all squeezed in the inside, except the long one. So what the crew has to do is attach this to the wall, like they were going to do the experiment - the T027 experiment. The next thing they do is attach the center poles which are - come in five different segments. And the total length of that pole would be, then, 27 feet. But they don't attach all the segments at one time - 4--foot section at a time. And as they get the pole out, this keeps on going up and up and up and further. And, finally, the springs that are attached to the hub, that wants to straighten out the poles, finally come outside, and they spring open. You see. And the spring force then drives these up like so. So that's how it gets out. It just gets pushed right out of the system and springs, then, allow the poles to come up. Now what we have done, we have run several tests to demonstrate the deployment in the packaging of the system. Now what we have done is to have this system completely packaged, and we raise it up in the air. We then deploy the parasol and insure that the packing is right - is proper, because, you see, it all has to accordian in, in order to get into the length of the box. And as this comes down, the telescoping polesattach to a back plate, and that's how you stretch the whole assembly out. And the ends of the poles are then disconnected, and you continue to push out. And then, finally, when the edge of the poles come out of the box or outside the vehicle, then they swing out and up. And I'll go ahead and just sketch this to show you the different stages. First, we would look and see the square hole for the scientific experiments. Then we would seem protruding from this vehicle as it came out, this long section just like I showed you here, at which

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time, when we got 21 feet in the air, which is the length of these poles, these segment poles then are pulled and they are all snapped into place. They then swing up, like so. The canopy then appears in that part, like so, only in respect to spacecraft, tangent to this surface, but 21 feet in the air, or in space, I should say. Then what the crew does is start pulling the assembly back in. As they pull it in, they remove sections until they get it down, essentially, resting on the surface again. That's the sequence that one goes through to deploy it. The other feature is that since it is on a pole, and, of course, this goes through a seal in the back end of the case of this box, which I didn't show here, this is a sealed section just like the experiment uses when the poles go in to deploy the experiment. It's the same system, same basic configuration to choose, same box, except the experiment's not there. Since there is a shaft in the center, we can go ahead and rotate it. And the process of rotating, I'll draw a top view looking down now. Solar arrays is a square hole, here is the sail deployed. Now the reason for the off-center is because the box, or the opening, that we put the pole on, is off center in respect to the area wewant to cover. We want to cover from here to here. See, so rather than having the fabric go all the way from this area, see, we just cut it back, such it's like that. Well, that fortunately gives us another advantage. It allows us then to rotate the poles such that they can put the sail in this direction and expose more or less area to the sun, which allows you then to modulate the temperature. Now, in the event - in the event for some reason something breaks or there's a foul-up in some fashion, this pole can be ejected. And the ejection is identical to the way you eject any experiment that happens to get stuck out in the area in order to deploy the experiment as a fixture on the end of the pole. Let me go ahead and draw the box.

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ARABIAN Go ahead and draw the box that the - and that's the T027 - T027 box or case. There's the plate on the bottom. There's the hole with the seals in it that the pole goes through in order to deploy the system. This being the outer edge of the spacecraft or the square opening. So these poles are all attached one to the other. We have deployed the system and let me bring it back down to the surface and so here we see the telescoping poles. Here's the spring joints that holds the poles flat. And in order to eject an experiment there is a special tube onboard with a handle on it and a little knob and you just turn the little knob and what that does it disconnects the tube joint and there is a spring in there and the spring just literally shoves the pole out. Then it would leave the space vehicle. It would be just like an experiment that could not be retracted so we use the same hardware and the same equipment onboard in order to do that. So from that standpoint then if for some reason something did happen, we could get rid of it. The other advantage - there is an advantage of deploying from interior of course it's not an EVA operation, it's the question of going into the workshop and taking this T027 which we'll take up in the spacecraft, and there's a particular place that's allotted to have it stowed and the package size is about 53 inches by 8-1/2 inches by 8-1/2 inches. That's the size of the pack. Looks like so. So the crew then takes this into the workshop and attaches it to the air-lock the way they would normally attach that T027 package. The poles that are used to deploy the system are carried in a separate package. And they are 4 - six 4-foot length poles. And they all screw and attach together. And as the experiment - as the Skylab parasol is deployed one just keeps on adding seconds and pushes it out. And as it comes out then the wings come open. Now, what we have done is tested the assembly for deployment out of the box. And I'll draw for you then how we did that. There is the box and here is the floor. This was on a crane of course. Here is the pole. The system was then deployed. We have verified the packing technique just how, in fact, that everything clears and is free and the whole process works. This has been done. Now there is one little problem, however, when you operate in 1g. Now as you are all aware things in zero g's will go - anybody or any particle, lines, you name it, will go and move until the forces go to zero. If there is any stresses on any material it will go ahead and deform itself until the stresses then relieve or they cancel out. So if I have a spring, light spring, let's say this pole arrangement you can understand, if I had this down in 1g it would fold down although I had springs trying to pull it up. I've had very strong springs, of course, that would

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come up and stretch out like they would in space but there are certain disadvantages of having too strong springs on the joints, of course. So on the zero g then you would have a different position that the poles would go that's GARBLE gravity. So, therefore, if I would go ahead and have to demonstrate how this would deploy and open up on the 1 g it becomes a little bit difficult. As a matter of fact, let's go ahead and deploy the system, and here are the poles. We have the fabric then when it comes out you see will drape like so, attach back up to the poles. I think you can envision that all right. There's all this fabric hanging. The fabric weighs about 12 pounds, between 8 and 12 pounds, about 9 or 12 pounds. Now you can see if the weight of the fabric on each pole is identical and all the poles are let go at the same instant it would just open up. It would open up just from the force due to gravity, the weight of the fabric itself, you see, pivoted about this point, you see we have a GARBLE which would then open up. In zero g, of course, you don't have that. You end up with a little problem then in trying to just get them all to come out the same instant. So we've done this and we have let it go of course and demonstrated that yes it will come out. But frequently what happens when you do this, you see, if I have more fabric on one side than the other and there's no way that you can control that, if you can envision the situation here. You notice, for example, I guess I lost one of my ties, but here's where it goes right here, you see just due to the unsymmetrical method of putting the fabric on, and there's a reason for that, I have more weight on one side than the other, so that says right off the bat if I release these poles at the same instant there is a good chance that this heavy fabric would cause these poles to get ahead of the other poles and the other fabric pulling over, you see, would cause these other poles then to go in that direction. If a situation like that did happen in zero g, there is no reason for it to happen like that since there are no forces there to cause that to go on. There is no gravity getting the weight off center. Then what would happen they would spring out and fold around, you see, because they are free floating. They have a position they seek. They would finally straighten themselves all out and the whole curtain would then be deployed. So the socalled problem or difficulty is, in fact, to show just how they would array out. But you can see, if you can conceive just what happens in zero g's, that it will deploy in that fashion. We have demonstrated that we can and it does. But the main feature - the main problem to overcome was to make sure that we can tack and push out and have the forces properly, you see, and we do

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have control of it and be able to pull it back and orient it where we want it, you see. That's the concept. Now do you have any questions?

QUERY Have you practiced putting up sort of a lopsided umbrella in zero g?

ARABIAN No. We have not practiced putting a lopsided umbrella up in zero g. Let me just try to show you what would happen if you have a nonuniform weight in zero g. I think you can appreciate and let me just go ahead and talk this way and have a pole with two arms on it such that they have springs and if I let them go they would come up in this position. Now let me do one thing. I'll just add a mass - or weight let's say on this pole and none on this pole such as this pole is heavier than that pole, however, they have the same moment trying to lift it up.

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ARABIAN ... and none on this pole such that this pole is heavier than that pole, however, they have the same moment trying to lift it up. What happens now - this one would get up there much faster than this pole because of inertia in other words it has to accelerate the weight, and get the weight movement. So it would not reach this spot at the same time this one would. This one would be much slower. But still it would move the weight up there. I could add more weight on to it even. It would eventually get it up there, it's just a question of time. If I had an infinite weight it would take an infinite time but it would eventually get to that point, you see, now it's just a question - it's just like I had a big box on rollers, you know, it was light, it doesn't take much to move it. If it's heavy, you know, it takes a while to get it going but once you get it going it keeps on going. So that's how it would happen so there is, yes, there would be more inertia or more mass on one side than it would on the other. And the curtain then would not come up. One side would get there before the other, as a matter of fact, it would isolate a pass and it would then damp on down you know just like as you would imagine you know something that was a spring - I just plucked it you know and it went damp you see. So that's the type of motion that we'd have.

QUERY Really a couple of questions. Won't it oscillate anyhow and how long do you expect it to take for it to reach a level position? Is it going to be a pop or is it going to be a slow motion thing or what?

ARABIAN Well, it would start out and gradually accelerate probably about just like I'm showing you here now. Now how fast it would damp would depend on - all the damping comes from the motion of the fabric and so forth, you see. If there was no damping whatsoever - it would forever oscillate back and forth. But because of damping, you see, it gradually stops, you know, and finally dies down. Now damping comes about from just friction in the system. Out here on the ground the air provides damping too, in fact, very much you see, and it would stop it. Which is another thing about deployment, when you do deploy it and it starts to move then the air velocity on this big area you can imagine just a big sheet like that. You see it tends to - it's not real as compared to what happens up there because there's no air. Yes.

QUERY Okay. How are the springs arranged to stop it at that neutral position and what happens when you rotate the pole since you've got essentially a free hub up there?

ARABIAN Right. In response to your first question, I will draw the detail. I have a spring that's

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coiled in this fashion, comes out and the poles attach to it. And that's just like one of these clothes pins that you squeeze, you know, these clothes pins the two wooden bills with a coil spring that holds it, same type of spring. The spring if you draw it three dimension looks like so, you see, such as I can take to bend the spring. My spring has a memory. There's only one place it goes for its stresses balance out you see and that's in this position. So if I pull that spring down and let it go you see this would oscillate back and forth and damp out. So the spring - the formation of the stresses in the spring is the thing that positions the pole. Now looking at the top view there is really two springs that we have, one on each side of the pole, attached to the pole. There's another one over here, coming in here, see. Now you can, I think, visualize, too that I can take in any plane and move that spring and it has some spring force in any direction see so it's just these springs attached to that hub or piece of piano wire, for example a piece of piano wire, you can take and move it in any direction and if you let it go it returns back to the position where it's attached, you see. So it's the same principle. I want you to think of just a piece of piano wire if you can envision that attached to the pole such that I could pluck it any way and it would stay in that position so that's what the joints like. Now what was your second question?

QUERY Okay. When you rotate it does inertia cause it to deform in the flat plane and then -

ARABIAN Well. Let's look at the top view and see what happens when you do that. And just for the sake of simplicity I'll draw this as a symmetrical curtain attached at the center point here with the poles coming out. Now if you can envision what would happen if you would take an umbrella for example and you move an umbrella, you know, it takes a little force to get it going and once it gets spinning it will spin pretty good. And the reason for that is because you have the mass out pretty far - long arms. This will operate pretty much the same way. There is a tie see across every corner. If you've seen one of these old fashioned clothes lines - pole clothes lines, you know, with the arms coming out and the strings holding you could take that and swing that around and the same thing would happen to this that would happen to that. So what would happen these poles would take a while to get them going but I could rotate it because we don't need to rotate it more than about 90 degrees. We could rotate it in any position, however, so you would rotate it slow and then when it would stop the poles would tend to move eventually they'd stop and oscillate a little bit, you know, and then that'd be it. And the way you would stop it is just from

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the friction on the pole.

QUERY Okay. But the spring serves as the hinge?

ARABIAN The spring serves at the hinge and it hinges in any direction.

QUERY Presumably that white material is the material you're going to use?

ARABIAN No, this is not. This is just a piece of fiberglas fabric that I got. The material that we plan to use is about 2 mils of Mylar and it's coated on the - I might call this the bottom side, with aluminum. Then on the upper side there is a fine nylon fabric. It's orange and bonded to the entire assembly. The Mylar has strength of it's own, you know, to give it rigidity. So does the nylon. In fact, the nylon does have fine - this material by the way in constructing it like this - it ends up - it's very, very difficult to tear it see. It's not like a piece of paper, once you puncture it some place it'll just want to tear. If you can puncture it, the puncture just stays there. You would take it in your hands and I wish I'd brought some of it with me to show you but it's very, very thin and light, but it's quite resilient, you know, and very tough. In the nylon in the fiber cords in there because the Mylar itself, you know, makes it that way.

QUERY It's from the same material that some of us saw that SEVA curtain being made of yesterday?

ARABIAN Yes. That is correct.

QUERY Just one other question. There was a rumor going around this morning that the parasol had failed its deployment test. This was presumably - this arose presumably out of the difficulty of deploying it in 1g.

ARABIAN That's correct, yes. It did deploy properly but it's a question of getting the petals, I say, to open up -

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PAO Peter Mosley.

QUERY It did deploy properly, but it's the question of getting the petals, I say - to open up, you see.

ARABIAN And I think I described to you why that would happen. You can envision, you know, poles and fabric in this room, if you try to stand it up, you know. In zero-gs, I think you can appreciate, it would fold out. In 1-g, you know, it's a little difficult.

QUERY You were saying that during deployment the booms or rods are held at the base while they extend. What do the crew have to do to free that?

ARABIAN Here's the box. In fact, let me draw it in a little larger scale. There's the base plate of the box, and there's a tube - I'll draw it - well, let me draw it in the inside, I think it's probably better. There's the base of the box, it's attached exterior. I'll just draw a short box, for convenience here. Here's the pole. The pole's about 1.4 inches in diameter. That's approximate, it's a little less than that. It's actually 0.359 inches, if you want to know precisely what it is. On the back end there's a clamping device that goes around here with a knurled nut on it, and I'll drawanother view, so you can appreciate how it works.

SPEAKER If this thing doesn't deploy, you know where you can get a good illustrator, anyway. (Laughter).

ARABIAN Thank you, Jack.

SPEAKER No, that was Neil, that wasn't Jack.

ARABIAN Oh, was that - oh, I won't thank him for that. (Laughter).

SPEAKER Listen, I'm the guy that's going to have to put it out, it better work.

ARABIAN You see, this is a scissor device that goes around the outside; it's attached to this plate. This is that pin, and there's one on this side, you see, like so. And the screw goes through with a threaded device so I can just squeeze the screw, see, by turning it, and it just grabs on the pipe and acts as a break. That's right on the back plate. So what happens, when they do get up in orbit, there's a stub sticking out here that has threads on it. And this is locked. Of course, one can appreciate that, since inside the cabin here it's 5 psi, and outside here, it's zero psi, we have a force, like a piston,you know, of 5 PSI over the area, trying to push it out. In fact, that force is somewhere in the ball park of 8 pounds, trying to force the tube out. Therefore, we've got to make sure it's clamped. It would be embarrassing to loose that tube. So, in order to prevent that from happening, one leaves this clamped until he adds the next section on. Now when the next section's screwed on, then we have a collar that goes

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on here that acts as a handle, too, you know, so you can push on. Then one can release this, you see, and you can't lose the tube, because of this handle, would go up against here and just stop. And once he gets to this point over here, if he stops, clamps this down, makes sure it's clamped, takes this off and adds another segment of tube on. So, this process continues until we - about 21, 22 feet above the vehicle. Then once that's happened, then the reverse process is used, that they pull a section back in, clamp it, take the section off, put this on and you pull it back down. Finally, in the cabin, you end up with a configuration that looks like that with the parasol up against the skin. Any time you want to rotate it, it's just a question of losening and rotating and turning this crew and locking it again.

PAO Arthur, go ahead - go ahead Peter, and then we'll get Auther.

QUERY Sorry, yeah. I'm still not - I can see how that works with the rod, the central rod, but you said that the ends of the telescoping poles also had to be held until they had extended, and then they would be freed in order to come out?

ARABIAN Yes. Well, how that works is, - I'll draw a spring, and here's the pole, it's held against. You see, there's a force trying to spring them up, hold it down. And this section, then, has these, all these telescopic sections. It's just like a fishing pole, same type of thing. So, in order to pull out this fishing pole, I have to hold it to this end so, as it goes out, the elescopes extend. And once I get it fully extended, see, then I have to disconnect at this point, see. So the way we do that is fairly simple; we have a screw that goes through the - goes across the plate, and it's a question of backing the screw up, and finally it lets the end of the pole go. And there are 4 such screws. So, once I've released the pole, then I can push it on out. But, I know when I've gotten to the limit, because I can't push any more. Because I push, and all poles are extended, snapped into place, and I can't go any more. That's the time you go ahead and let the screws go, and you continue pushing on out for the remainder of 5 feet. This is roughly 5 feet here, and that swings out. So the device is very simple. Mechanically, it's about as simple as you can get.

PAO Art Hill.

QUERY How long does it take to fully deploy this thing?

ARABIAN Once you have it mounted, and there's a tripod that the experiment goes onto that has to be attached also. Now, I'll go ahead and just change that direction here; I'll put a floor in the OWS, and here's the wall going out. This is the outside, this is the opening that I illustrated at that point. The tripod support that's there for the experiment. In fact, if one would have looked at that box, and what not, that looks like T027 experiment, same case, same everything. So, you have to make that installation. Now, once you get to that point - -

SPEAKER We have to move the water tank I be - we have to move the big water tank, I believe.

ARABIAN Well - well whatever - however you do it for the experiment, you do the same thing for this one. So, that part of the procedure is the same all the way up to that point. See, what you have to do in order to put the T027 experiment, attach it, it's the same thing for the parasail. Excuse me, the Skylab parasol. Then once that's done, it would take probably in the order of - it depends - See, we hadn't done this in zero-gs with the crew - I mean seeing timewise - I mean time in the motion. But, I would think, it would take probably in the order of, oh, a half hour or so, certainly, 15 minutes, somewhere in that ball park in order to get it fully deployed.

PAO Carolyn Callahan

QUERY Considering your understanding of this and your enthusiasm for it, are you the individual who designed it?

ARABIAN No. There was - The basic concept, first of all, was thought of from Jack Kinsler. And he was originally going to use fishing poles. And from that point, fishing poles for the telescope and sections. Now, as a result of that, there was - it developed in fairly short order, you know, as one might imagine. And ah - There were inputs from various individuals and what not, and so forth, and so on, and from that we developed the system as you see it today. But, basically, it was his concept to start with.

PAO Let's go to KSC for some questions.

END OF TAPE

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QUERY

I've got several questions. But first, to make sure I understand you correctly without the benefit of your blackboard sketches, if I had an umbrella and I kept the ribs locked and then squeezed it out through a very small window open until the ribs were clear or about to clear the window, and then released the ribs, as I pushed on out we get the spring action and the parasol would open? Do I understand you correctly?

ARABIAN

Yes, that's the basic principle. Yes. Of course, there's no center section with little ribs going to each outer telescopic pole like you have in the umbrella. But if you can imagine an umbrella with springs up at the apex of the umbrella to pull the ribs out, to deploy the ribs, but your description of how it gets out and how - the principle of deployment is, in fact, correct.

QUERY

Thank you. Another thing I wanted to ask was, you want to get this now on the skin of the workshop, not slightly above to get a shadow line. Is this because of attitude maneuvering and you want to make sure it's just firm?

ARABIAN

Well, for one, there is a point where if you went far enough out, you would then attend to allow the temperature to change because of the distance that you were away from the workshop. So there's - thermally, there's no advantage to a, let's say, being right on the surface or being, let's say, 10 to 20 inches from the surface. Of course, being on the surface, any motion that you have would tend to move the parasol in the direction of the motion of the body. So there is an advantage to having the parasol against the body, from that standpoint.

QUERY

One other question I wanted to ask was apparently the parasol is going to be the last part to arrive at Cape Kennedy, have you got an EETA on when you might get it in here tonight?

ARABIAN

Probably, as it looks right now, it will probably leave Houston before midnight. It would arrive at the Cape -

QUERY

Could you tell us why the 22 by 24 feet was selected rather than the 22 by 22, or 24 by 24?

ARABIAN

Yes, the area that's uncovered on the workshop is such that if you were to project it on a flat surface, it comes out to about 22 feet by 24 feet.

PAO Okay, we'll come back here for questions again.

QUERY

Two questions, one for Neil, and I'll save it to the last. Number 1, what is the maximum distance from the skin will the parasol be before you begin to pull it back down to the skin?

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ARABIAN A little more than 21 feet.

QUERY And then you pull it down - 21 feet from the skin, and then you pull it back down.

ARABIAN That is correct.

QUERY Okay. Neil, did I detect a note of skepticism in your voice a few minutes ago?

HUTCHINSON No, sir.

PAO Any further questions? Abbie.

QUERY Have the crew practiced deploying this parasol in the water immersion tank at Marshall? And if not, will they?

ARABIAN No, they have not. This - they are well familiar of how you operate the T027 experiment. And you can appreciate, since the exterior is essentially the T027 experiment and the pole diameters are the same size, the ejection system is the same, crew training is really unnecessary.

QUERY And exactly how far away from this skin will it be once it's deployed? Once you pull it in?

ARABIAN Oh, probably about 6, 2, 3, 4, 5 inches, something of that sort. We can pull it back any position we want; it may be right against the skin, too.

PAO Just a minute, we'll get one back here and then we'll come up.

QUERY How soon after launch is it likely to be deployed?

ARABIAN You have to rendezvous with the space vehicle, first of all. And the idea would be to dock with the workshop, and then go into the workshop, take the package that I showed you, that would be the T027 package, mount it in the spacecraft, take it into the workshop, and the details of the time-line I can't tell you, (maybe Neil might be able to shed some light on that), but at the appropriate time, then they would go into the workshop and attach it.

HUTCHINSON Yes, we have this all set up in the time-line, and basically, as Don described, the first day, of course, is the rendezvous and the SEVA and docking. And they're going to sleep in the CSM that night, and we're allowing them 8 hours of sleep, and I believe, the last time I looked at the timeline, we were getting them up at 12:30 Zulu which is about an hour and a half late - an hour and a half after their normal wakeup 12:30 Zulu which is like 8:30 - 7:30 Houston time. And we'll spend the morning going into the workshop - going into the airlock MDA and turning it on, and getting the air circulating in there, and doing various things like that. And basically, we have allotted the entire afternoon for this operation of the second day - and like Don said, the timeline, as we see it, doesn't require anywhere near that much time. However, there are some preparatory things we have to do. Like I said, we have a big water tank down there which has to be moved to its on-orbit location up in the dome, and then they've got to deploy the box and get the tripods set up and get it all mounted, and that all takes some time. But we have, essentially, the entire afternoon of the second day to conduct the operation.

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HUTCHINSON But we have, essentially, the entire afternoon of the second day to conduct the operation.

QUERY About Saturday afternoon, Houston time.

HUTCHINSON Yes, sir.

QUERY After everything is set up, and you've got the umbrella retracted to whatever distance you decide to have it from the skin, does all this arrangement, then, have to remain up - the tripod, the projection into the work area, and so forth? Or how does that go?

ARABIAN Yes, you must retain this mounting in the tripod, and so forth. Because, you see, the parasol is attached at this point on this bearing. That's the attach point, and it's attached to this point on the pole, you see.

QUERY So what you're talking about there is that - that minimum 5 feet, or so, of pole length held within the box in this case, huh?

ARABIAN That's correct.

QUERY Will that cause any impact throughout the rest of the mission, in terms of the projection being out in the work area, you know, forever and ever, amen?

ARABIAN Well, certainly, one could not use this portion of the experiment that's supposed to be used. That's the only effect that will occur. Of course, you realize there is an airlock for experiments on the other side. But the T027 experiment, for example, see, will not go out here.

QUERY The diameter of - well, of course, it'd be a changing diameter, but the diameter and material of the ribs. And would you run through again lengths and numbers of the joints in the ribs and in the pole.

ARABIAN The ribs are constructed of aluminum tubing. And the - there are seven sections. (Later corrected to five) The smallest section is 3/8 inch outside diameter, and the center tube is about 1 inch diameter, the one that's closest to the spring. And the total length of the extended rib is 21 feet - about 21 feet. And there are four such poles. The springs are nothing more than spring steel, or piano wire. The hub that the spring is attached to, which is nothing more than two blocks of aluminum that's been machined circular, and there's screws that hold the assembly together; that's aluminum. The poles, then, that attaches the assembly together down into the bearing, that's aluminum tubing too.

QUERY Two springs per rib?

ARABIAN There are two springs per rib; a total of four springs. Excuse me, it's a total of eight springs.

PAO Yeah, I understand we have some more questions at KSC, and let me tell the people at KSC I've just been informed that a video tape of this briefing will be shipped to KSC this afternoon. So you should have it there this evening sometime, complete with blackboard drawings. We will take any questions from KSC now.

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QUERY This is Red Moore again. I just want to make sure we understood an answer to a question correctly. I think Neil answered a question about have you got a time blocked out for this, and the way my notes read, Neil said, "First day rendezvous, SEVA, dock, sleep, 7:30 a.m. get them up, MDA in the morning, parasol in the afternoon." If we read that correctly, why the SEVA on the first day?

HUTCHINSON Well, the SEVA on the first day, of course, is being done for a couple of reasons. One is - the SEVA is being done for a couple of reasons. And I don't know which one you place more importance in, but one is to clear away any possible debris that is in the vicinity of the place we have to deploy this thing. We're not totally sure exactly how much of that meteoroid shield might be around, and, of course, we have to have a clean hole to go through here and a clean area, to be able to deploy it. The other thing, of course, we are still hopeful that we can get SAS wing 1 out. And, depending on the crew's evaluation of that situation, we will, hopefully, make an attempt to deploy the wing.

PAO Okay. There are no more questions from KSC. Reg.

QUERY Two questions. One, have the crew expressed any views about this and their choice? Is this their first choice, too?

ARABIAN Their feeling, I believe, is that this is much easier to do. And their first choice, I believe I'd say a first choice, to deploy a system from internal - the vehicle itself out through the airlock. If that doesn't work, of course, you can eject it and go out and do something else. The reason that's the easiest is because they're familiar with the entire operation, except, you know, what's going to happen at the end of the pole.

QUERY One for Neil. Could you tell me, please, when they enter the - into Skylab, is -

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QUERY One for Neil. Could you tell me please when they enter the - into Skylab is the hatch between the airlock module and the workshop open or closed?

HUTCHINSON Well, we have - there are really basically of course four hatches between them and the OWS and in order there are the MDA hatch, well there are really five when they start out. There is the hatch in the tunnel in the CSM. There is the MDA hatch. There's the airlock forward hatch, and the airlock aft hatch and then the OWS hatch. In that order going back they are all closed. The two lock compartment hatches, the pressurization equalization valves in them are open so that even though the hatches are closed there is air flow through the hatch. And, as you know, we have a check valve that flows air through the OWS hatch, going into the OWS and the hatch is leaking coming the other way. So that hatch essentially has air flow through it also.

QUERY Can you tell me what the earliest meal the astronauts might eat in the wardroom. Would they eat some food that is packed in the workshop?

HUTCHINSON Yeah. Let's see we're on command module food nominally through day four. That's nominal plans so I guess you'd have to say - I believe it's the breakfast of day five, is the first workshop food we eat. We really ought to get them an absolute answer on that Jack. I'm almost sure that's right but -

SPEAKER Okay. We'll double check.

HUTCHINSON And that's nominal by the way that's what we planned on doing all along. They take essentially day 2, 3, and 4's food in the command module. Now they prepare it down in the workshop after day 2.

QUERY As a follow to that - I'm sorry if I missed this because I got in late but you may have said it, but on which day do they reckon to first sleep in the workshop?

HUTCHINSON If all goes according to exactly the plan we have now and the parasol is deployed, we'll sleep in the workshop for the first time on day 3. That's one day late. That's one day past nominal. The obvious reason being that once the parasol is up it's going to take that volume a while to cool down and basically once we get the parasol up we're going to come back out of there and we'll sleep in the command module the night of day 2 and then day 3 we're going to get up and go into the workshop and turn it on. And they will sleep there day 3 - the evening of day 3.

PAO Okay. We'll take one more from Ed DeLong.

QUERY If I understood you correctly, Don, when the crew deploys this parasol or attempts to deploy it

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that will be the first time that they have done it period, is that correct? They will not have practiced it?

SPEAKER There is a possibility that they will have tried it at the Cape. They plan to have a unit down there and if we can fit it in the time they will have, you know, they will be able to go ahead and actually deploy one. But from - they have looked at the system and they feel like the training really is not necessary because they are familiar with T027.

PAO Okay, Carol, one more.

QUERY Is there any one factor right now that would force you to delay again as far as training or stowage or anything like that? Are you really going to be able to do all that?

ARABIAN Well, having been tied up with this operation for the last several days there is nothing that I am aware of that would cause any further delay but Neil can probably answer that better.

HUTCHINSON Nothing that I'm aware of.

PAO Okay. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift briefing
Johnson Space Center
May 22, 1973
5:22 p.m. CDT

PARTICIPANTS:

Milton Windler, Flight Director
Richard Johnston, Director of Life Sciences

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PAO All right, we'll get started here. We have Milton Windler here, Flight Director and in about 10 minutes, Dick Johnston, the Life Sciences Director, will join us. We'll get started with Milt Windler right now.

WINDLER I really, primarily, came over to answer questions about things other than food because Dick will be here. Since you didn't get a little briefing this morning you, probably however, though are aware that we did go back to, for 1 revolution - daytime revolution through solar inertial, and we rezeroed in the attitude reference system - the rate gyros with the Sun sensors - and we're - I started to say pleasantly surprised, and, I guess, surprised isn't really the word. We were pleased, though, that the attitude turned out to be within a couple of degrees of what we had thought it was by using the techniques I described yesterday; that is, the temperature measurement devices on either side of the spacecraft and also the power from the solar arrays. So, actually that turned out to be - to work out well. We did update the gyros. We also got some better drift information on the gyros and were able to compute some compensations and inserted those into the computer to make that compensation. After that time, we went through one rev pitched up at 80 degrees. Essentially, to cool the spacecraft down, as you recall, we talked about yesterday. We still have this problem between these two areas - one of them too cold and the other too hot. And, since yesterday, of course, the suit umbilical system is come back up to where it's well above the - you might call it the red line. However, the cabin continues to be hot and we're still concerned about the food and Dick Johnston will tell you a lot about that when he comes in. And, after that one revolution at the high angle, we then dropped down to the attitude that we maintained all day long, which was a pitch angle of 45 degrees. And throughout this day, basically, the suit umbilical system temperature has stabilized. Probably come up, I believe, about 1 PCM count, about 0.2 of a degree. Last I looked at it, I believe it was 34.9. The cabin has not decreased any, really - it's just about - Well, it decreased some when we pitched up, but it's still quite difficult to tell what the temperature is in the cabin because the sensors are off-scale at 120 degrees. The estimates of it are in the order of around 125 degrees. You might - They vary, I guess, plus or minus a couple of degrees. So, we're now comtemplating pitching up another 3 degrees to help alleviate that situation. As you can imagine, too after this revolution at the high angle, we did have to take some some time to get the solar - the batteries, I should say, back fully charged. And that essentially happened today while we were in this 45 degree attitude. So, other than that, we've

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been - things have been pretty quiet as far as the spacecraft is concerned, and we continue to zoom around waiting for the crew to do their thing and get there. And that takes us up to where I am now.

PAO Start right over here.

QUERY Milt, what was the arguement between you and Huntsville this afternoon over the attitude we'd be in for the next couple of revs? What attitude were they wanting the spacecraft, and what was Houston wanting, and who won? Why the difference of opinion?

WINDLER Well, I don't think that I had an argument with Huntsville. They had a recommendation and I had some questions and, I guess, in true fashion we - The 3 degrees is a kind of a compromise between the 45 degrees that we are in and the 50 degrees that we experienced 2 or 3 days ago - whenever it was - that seemed to hold our cabin temperatures down.

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WINDLER - days ago, whenever it was, that seemed to hold our cabin temperatures down. We - there was some question of both of these two areas is subjective, as you probably got the idea yesterday. The exact point at which and the exact extent of the potential damage to the suit umbilical system and AM coolant loop is - hadn't been tested and there is some engineering judgement involved there. And likewise the food is subjective in another sense. So we're still trying to balance it and the question was what, I guess the - you know, the effects were of either staying where we were or going to 50 anyway. So the 48 degrees represents an intermediate position. And the intent that - in fact we haven't really decided to go to 48. As a matter of fact, Chuck Lewis will decide that. I would debate it, however you wish to look at it. But anyway, the intent is to - we also want to take a - put some roll in the spacecraft to fix our attitude a little bit there. But we plan to look at it for one more rev and then go to 48, assuming that there is nothing unusual happens in the next rev.

QUERY Also the 125-degree estimates you're giving, are those estimates from the surface temperature sensors or are these average gas temperatures? And how do you go about guessing what the temperature is when its off scale at 120? What things do you use?

WINDLER Well essentially - first of all we really don't have any gas temperatures because the gas isn't circulating and actually the measurements which would give us the gas temperature if they were circulating are really just, you know, they're sitting on a - in a piece of duct work, so they are structural measurements just like the rest of them are. But what we've done when we first observed the temperatures to be climbing right after the spacecraft got on orbit - of course all the temperatures then were on - the inside temperatures were on scale, and they were - relationships were developed between different sensors. And also when the concern came up about the food and the film and other parts of the spacecraft, the various sensors were identified as being some that were the best estimates of temperatures in those concerned areas. And the cases where we've gone off-scale high, we tried to develop a relationship between that sensor and another sensor. And as long as we stay in this relatively - at least we think - as long as we stay in this stable attitude, relatively stable attitude, with zero degrees roll and we're trying to keep our yaw to zero and just varying the pitch, relatively, a small amount - in fact we've essentially been between 40 and 50 degrees all the time, except for these small periods. So we hope that we can maintain this same relationship. But this is

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- also its an engineering judgement as to how you relate those sensors and it's part of the questions and answers that we have to go through.

QUERY What's the current situation as far as the TACS usage is concerned?

WINDLER We're using around, a little under 500 pound-seconds a day. I believe the number is 487 or something like that - it was this morning. We have not used any today. And during my shift we used some I believe just before - well we used some just as I came on. And I really don't have a real up to date number because I'm not familiar with the new flight plan. We were operating I think I indicated yesterday - we have about a 50 percent margin and we've used half of that. So we were about 25 percent above our old flight plan. But I don't know what the new flight plan numbers are. And we could get the answer to that I think over in the Control Center. But I don't know what it is.

QUERY What's the status on the cabin purge?

WINDLER We are going down from the second cycle. We were about 1.3 psi going down to 1.6 indicated when I left. And we of course still plan to make two more, and get up to 5 at entry into the MDA - into the airlock module.

QUERY I was going to ask that, but I will ask another one, and that is why are you doing these purging cycles?

WINDLER Well this is the number that is felt to be effective - -

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WINDLER Well, this is the number that is built to be effective to reduce the potential contamination level. And I've forgotten the exact number. I think it was probably stated for us. Was it 0.02? Was that the number? Something like that. I forgot where the decimal was. But, it's felt that if we get down to that level, we'll be in reasonable position because it can be scrubbed by the mol sieves and the charcoal beds, etcetera, and this is what we think will take to get us there. Does that answer your question? Okay.

QUERY Do you know what the status of revising the flight plan is at this time - at this stage of the game and how far along it is?

WINDLER It's - I'd have to say that it's probably - just give you a rough estimate - probably 80 - 90 percent done; maybe even above 90. Virtually all of the documentation has been through more than one review cycle and it's pretty well falling into place. A lot of it has gone to the printers and I think that the documentation and so forth is really shaping up well.

QUERY As far as you know, Milt, what is the present - what are the - what is the present priority for the various plans to put out sunshades? Which one is to be tried first, as far as you know now?

WINDLER Okay, now ... will have to update me on what they're calling things these days, but the - I think that the parasol or the umbrella or whatever it is, is still number one in the Marshall, EVA or technique with the - we'll just call it a sail, I guess. What do you call it? The VIG? Is that it?

SPEAKER The V-frame.

WINDLER The V-frame? A-frame? A-frame. Okay, thank you. And those are the only two, I think, that are in primary contention. I think there's still some talk about the inflatable mattress or whatever you want to call it, but that's not - -

QUERY What about the standup EVA from the command module? Is that pretty much ruled out all together?

WINDLER Well, I don't know that it's been 100 percent ruled out, but it's down farther on the priority list. I think Mr. Disher said something about that this morning. In fact, that's about the only part of his conversation I heard. He pointed out, I think, that it's lightweight and it still has some advantages, but it also had disadvantages and it looked like these other things would pay off more in the long run.

QUERY I take it from your opening statement that there's no trouble with increasing drift rates now in the rate control gyros or anything like that?

WINDLER No, I wouldn't call it trouble. We're kind of concerned, if that's the right word to use. We're curious, maybe is a better word, about why it's behaving like it is. The drift rate doesn't seem to be continuous and - constant, I mean. We feel like that we have it under control and everything. And we've made these updates that essentially take out the effect of it, but it does vary slightly and we didn't expect this, of course, and we are trying to figure - understand it better, I guess, is the right way to say it.

QUERY We have had Mr. Richard S. Johnston join us here, now. He's the Director of Life Sciences at the Johnson Space Center, and we'll let him make a brief statement before we go on with the questions.

JOHNSTON Okay, I understand there's a lot of interest in how the food is doing in Skylab. Let me start off by saying I think that when we found we were experiencing some elevation in temperature, we were concerned to know how hot it was going to get and the effect it might have on the food. Now, we've - as a part of the food qualification program, we did take certain of the foods and run them for periods of up to 14 days at 131 degrees Fahrenheit. And I think the main thing that we're trying to do, like we do everything else in the space business, is to be thorough and understand if we do have problems. And I can say right now that where we stand with the food - We do not think we have any safety problems whatsoever; that is, in the way of food spoilage. We have taken samples of the food and have tried to track the spacecraft stowage temperatures for the bulk food, and are taking these samples out on a periodic basis and inspecting them. And we're running - we've run one lot at 130 degrees Fahrenheit and, the others, we've tracked the spacecraft temperature. And I just came back from a session where we opened some of it, and I ate some of it myself and it tastes just great. So - -

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JOHNSON - the spacecraft temperature. And I just camb back from a session where we opened some of it and ate some of it myself, and it tastes just great. So I think that - we really don't think we have any problem. It's our intention to take samples of all the food, all the nonfrozen foods, and to follow the temperature profile through SL-2, through the dormant period between SL-2 and SL-3 so that we'll have a pretty good understanding of the quality and the condition of the SL-3 food. And that's all I really have to say. Thank you.

QUERY Okay, Dick. First of all, what were the foods that you tasted that tasted great today? And okay, you don't think you have a problem but what kind of limits - where would you have a problem on the food - I mean how much can this thing take without having to worry about it and for how long? And what could happen as far as the taste of the food is concerned in the long term? Can you describe it to us in tasting terms rather than in scientific terms?

JOHNSTON I would almost like you to write that question down. Let's see, what are we going to do as far as limits are concerned? I think first of all, the crew is being trained to recognize visual signs of, or indicators of, food spoilage before they even open a can. What food technologists call a "hard swell" which is an indicator of gas production. There are procedures being put into the flight plan, and they are being - the crew is being briefed to recognize that. Now we really don't anticipate that sort of a problem. But that's kind of the worst case. Where the temperatures are right now in the spacecraft, the predicted temperatures we were well under the temperatures we are running our worst case testing, which is 130 degrees. I think the fluid locker temperature is 125-1/2 or something of that sort of a level right now. The foods that I've tasted - I ate some peanuts and yesterday I ate some peaches, strawberries, veal. That's just a pretty good sample of it. The foods that we have - the most concerned about are stabilized foods. And these are the ones that we're following most closely. And that is the reason they're because in their initial preparation they are not, I don't know if the word is sterilized, but they are not heated to the same temperature level some of the other foods are, and there is a possility of anerobic spores that could - no, don't use that botulism b -anerobic spores that could if they got to the right temperatures with the right humidity conditions - could start growing.

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QUERY What do you mean by thermostabilized foods?

JOHNSON Things like puddings.

QUERY You've tasted the peanuts and peaches and all but not the puddings and the turkey and gravy.

JOHNSON I've tasted some butterscotch pudding that was heated for 6 days at 130 degrees and I've tasted some that's been through the temperature profile in the spacecraft. I'm not the tasting expert in the Center, I just happen to be there - not that we have any. That's the next question.

QUERY Are you taking any foods at all, sending any foods up at all in the command module as replacements? And are there any limits on the medical tests that you will - I don't know how to ask this question, but are you scrubbing or changing any of the - limiting the results from any of the medical tests because of the changes in temperatures?

JOHNSTON The answer to your first question is no, we're not taking any additional foods in the command module. Dr. Malcolum Smith, the head of our food group, and I just left him and I think he is very optomistic as far as the food being in good shape and we don't see any change or any effect on any of our mineral balance studies or any of the other medical experiments at this time.

QUERY Over the loop from the MOCR we've been getting a lot of predictions that the high temperatures - -

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QUERY Over the loop from the MOCR we've been getting a lot of predictions that the high temperatures might cause unpalatability. Just what does that mean? A really serious unpalatability to where the crew wouldn't want to, or be able to eat it? And in what foods?

JOHNSTON Now, I think yesterday, we had opened some food that was - some scrambled eggs, that we'd had 5 days at 130 - and they had turned to look something like Grape-nuts. They kind of turned a brownish color, But in going back and checking the lot of food that they were produced under, we actually had hurried the production up to meet our SMEAT test last summer, and we had waved the head gas requirement. That's the gas you have above the food, and there was some oxygen in there. AND so, we went back and repeated with our lot B food, which is the food we're flying and it has an inert gas above it, nitrogen, and those eggs looked great. So, I think that the first indicator we had yesterday on the scrambled eggs was really not having the absolute flight-type food. Okay? So, I think that as far as palatability - you know, that's anybody's guess. There could be some of the freeze-dried foods and things may fuse or something of this sort, but as I say right now, everything we've looked at, to date, looks like the food will rehydrate. And, from the little bit of tasting some of us have done around the center, we don't see any big change in it.

PAO We'll take one more question from here and then we'll go to the Cape.

QUERY What's the status of the film in the workshop? How much do you think it's been affected by these high temperatures?

WINDLER Well, I'm not really - I haven't been asked that question in about 2 days. They had a - some of the film they were talking about taking along - I think the most sensitive film was the S183 and maybe some of ya'll have some ... And they do plan to take that up, I believe, is the last I'd heard - some replacement film. And I think some of the EREP film and tape was going to be taken up. Not a complete supply, as I understood. I haven't really followed that too closely other than to be aware that they were obviously concerned about it since this film is relatively sensitive - very sensitive, I guess, is the way to say it.

QUERY Some questions concerning the activities of the astronauts. Has it been decided yet who is going to push out the umbrella device? And who would attempt to repair the solar wing and who would make the EVA with the A-frame thing?

WINDLER I expect that's been decided and I don't

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know - -

JOHNSTON I Do.

WINDLER Oh, he does. Okay, thank you.

JOHNSTON W just wanted to see if you knew. The standup EVA, Weitz will perform, the deployment of the Marshall sail will be Joe Kerwin. And I think the pilot and Conrad and Weitz would go down and work with theSO27 package, which they are trained on, which would be the deployment of the para-sail or any other airlock heatshield devices.

QUERY For Milt Windler. In all of your simulations for Skylab, did you ever run across anything even approaching this type of situation? Did you ever simulate anything quite like this?

WINDLER You know, we were talking about that about 3 days ago. And we remarked how much like a simulation this was, except that at the end of a simulation, you can say, "Well, that's the end of that." And you can forget about it and come back in 3 or 4 days and try something different. And in that case, of course we had to continue on. Actually, it's remarkably like a simulation, I think, in that there's just one problem after another, We have not simulated this precise case. We've been concerned about attitude control, individual things, but nothing really is all put together just like this one is.

QUERY In the flight planning, is there any consideration being given to a launch on other than Friday, say Saturday or Sunday or so on, when they'd have a 20-rev rendezvous?

WINDLER Dick may be in the best position to answer that. I know that yes, there is consideration being given - I mean, it's an option and we're - have investigated to see - -

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WINDLER I know that yes, there is consideration being given, I mean it's an option and we have investigated to see what it would involve.

JOHNSTON I think we're planning on a Friday launch. We're going to launch when we're ready. I guess that's all I can say. I think that everything points that we're trying to get it off on Friday. There are other launch opportunities if for some reason equipment or something isn't ready.

QUERY The heat shield is going to be set up to reradiate the sunshine or heat radiation back into space. It will however absorb some - physics tell us this. Will it absorb enough to melt or has anybody looked at that problem?

JOHNSTON There's testing underway - looking at those problems, and I'm really not qualified, let alone Milt. I know that is a consideration and there is a lot of testing going on both at Marshall and here at the Johnson Center to understand this. And I don't think we, I'm sure we have ways - materials that we feel can do the job, but we are verifying this aspect of it.

WINDLER I understood that there was a number of something of around 300 degrees that they expected this material to reach. And that they had investigated it and they knew how it would change and also I believe it's the ultraviolet that affects it or something like that. But they expect - oh pardon - and they have, as Dick says, they have looked at the environmental conditions it will be subjected to.

QUERY Although the standup, although the command module EVA to deploy a sunshield has now a lower priority than it did a couple of days ago, do they still plan to deploy the solar shield, the solar array, from the command module?

WINDLER I think the answer to that is yes.

PAO Any more questions here?

PAO Nobody has any questions?

WINDLER We need that power.

SPEAKER You've got what?

QUERY Dick, in brief form, how are they going about running these tests on the food?

JOHNSTON Well we have large ovens which we have temperature controls on. And we, it's like your wife baking a cake, we set it at the temperature we want it and leave it there for a period of time. Each day, we inspect the cans for swelling, as I mentioned earlier. And then we have a plan where we pull the foods out and open the cans up and do other testing with the food - visual inspections, color comparisons and so on. So this is really the way we're doing it.

QUERY If you put them in an oven, they are going to get heat from all sides. But is that the way they would

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be heated as far as this solar radiation thing is impinging on the spacecraft?

SPEAKER Well solar - the cans of food are in another overcan, and they are inside a locker, which you are really concerned here with is conducted heat. It's not a question of solar radiation or anything of that sort. It's just a thermal question.

QUERY So the cans on board the spacecraft are really being canned just as if they were in an oven?

SPEAKER As best we can in zero g. We don't know about convective heating and all that. But we're - I think that the situation of foods in the spacecraft - the way we're heating in our ovens here - this would be a pretty good test of how the foods are being heated there.

QUERY Do you have any word on what the crew's evaluation is of the various plans from testing at Marshall in the water immersion tank?

SPEAKER No, I don't.

QUERY Dr. Johnston, you gave us one example where the food that you're testing at a maximum - at the maximum heat is different for the food that's on board. Is this true for the whole lot that you're putting under - -

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QUERY - testing at the maximum heat. It's different from the food that's on board. Is this true for the whole lot that you're putting under the maximum temperature test?

JOHNSTON No, let me make that clear. Back last summer, we were trying to get this 56-day chamber run-off and we were in the midst of completing the formulation of foods and, at the same time, we were trying to get the tests started. We had made a special purchase of what we call lot A foods, which was the first production run of food, and in trying to get that food delivered, we were not able to get certain of the foods packed with the right gas above them. And that's the only difference. Now, let me make it real clear to. All the flight food we have in the spacecraft has been produced, really, under very rigid controls, and those certain things, like the head gas space and all like that, has been checked very carefully and I'm confident we have no problem with any of our flight food in that regard.

QUERY I may be mistaken or misinformed or confused or a little bit slow, but it seems to me that Mr. Disher, this morning, said that there were no certain plans to try and activate the solar wing on - by the first crew. And ,does it boil down to whether or not there's a lot of debris up there or are you guys conflicting with what your - the planning is?

WINDLER I may be confused also, because I thought we were going to try to do that. I didn't know that he said that - -

QUERY It seems to me he said that there are no certain plans to try and activate the solar wing..The second crew could possibly do it.

WINDLER Now all of ya'll understand what he just said the same way?

WINDLER Well, we'll call and find out if it's still in the flight plan. I thought it was. I sure would like to have some more power.

QUERY I go back to the food a minute. You made this reference to something under gas. I don't understand what we're talking about.

JOHNSTON What you're - when you package the foods there's always - We don't pack it in a vacuum. So that means there's some - either you have air - a layer of air or some gas above a small residual volume that's left above the food in the can. Do you understand what I'm talking about? Okay? And that's what I'm talking about head gas. So, if you put nitrogen in there you prevent oxidation in some of the food. And we, in lot A foods, did not have that. Okay.

QUERY Will you explain - How about poisonous gas

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in the cabin - that come ... (garble) shield - some kind of that matter - I have there ... where that kind of poisonous gas come from - the walls are - -

WINDLER I didn't understand the question. You're talking about the gas that's being generated - outgassing in the spacecraft, but what - what was the question now?

QUERY I - There is poisonous gas around in the cabin?

WINDLER Is there some? Well, we - I guess the best way to say that is - There's a possibility that there is some and that's the reason for doing this so-called purge or pump or whatever you want to call it, where we're dumping the cabin and filling it back up and dumping it four times - or five times, I guess, counting the first time. So, in a way, it's a safety precaution. You can show that it could be there. Other people can show that it isn't there, but we think that it's a chance that it's there and we'll getting rid of it if it is.

QUERY Dick, as I recall, it's 10 percent of the total food content that's thermostabilized? Is that right?

JOHNSTON Actually, it's 5 percent.

QUERY Okay, what percentage - and is it also limited to just thermostabilized food - might be affected by the unpalatability aspect, but still be safe?

JOHNSTON Well, I don't really think we're going to have any palatability problems of any - -

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QUERY A unpalatibility aspect but still be safe?

JOHNSTON Well I don't really think that we're going to have any palatibility problem with any food with what we've seen right now. That was the unknown we had a few days ago, but I think from what we've seen so far, we feel we don't even have that palatibility problem.

QUERY Okay, so you say you don't think you have a palatability $roblem. You don't think under current conditions you've got a food safety problem either. So are you saying that unless conditions get worse, you're pretty much writing off your worries about this area?

JOHNSTON Well, we're going to continue certainly to watch it. We are also going to ask the crews to bring some samples back. When the crew gets up there, we're going to learn an awful lot. I think we're doing everything we can on the ground to understand the problem as best we can so that we can give the crew good intellegence as to what we think the conditions of the food would be. And I think if they were launching tomorrow morning, I would tell them that we don't think they have got any problems and we're telling them how to recognize problems as they do occur. And we will of course be communicating with them daily. And as I said earlier, I think there are lots of things like this in the space business that you always look at things in a negative way initially and try to run tests to understand it. And I think we have a lot better understanding of this whole food problem now than we did a week ago.

PAO All right, in case there are any questions concerning this flight plan item, the SEVA, we will call the Control Center and get the final word on that or what the word is now. And you can check with the query desk. In case anybody at the Cape doesn't know how to spell Mr. Johnston's name, it is Johnston.

PAO Thank you.

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SKYLAB NEWS CENTER
HOUSTON, TEXAS

SKYLAB STATUS BRIEFING
Johnson Space Center
May 22, 1973
10:00 a.m. CDT

PARTICIPANTS:

John D. Disher, Deputy Director of Skylab Program Office,
NASA Headquarters
William O'Donnell, Public Affairs Officer of NASA Office of
Manned Space Flight

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PAO Okay, we have with us again this morning Mr. John H. Disher who's Deputy Director of the Skylab Program out of NASA Headquarters. John.

DISHER Thank you, Bill. Good morning, ladies and gentlemen. I'd like to recap where we stand on the sun shade development. I'll ask that you let me go through a brief narrative, and then I'll be happy to answer questions. Let me use a little visual aid here to try and organize the activity. We have four types of devices under development. We are going to - assuredly going to carry two of them, the two that I have blacked checked. We may carry a third, depending on final weight and volume rackup late tomorrow or early Thursday. I'd like to describe the devices. I've tried to use the same terminology that was in yesterday's press release; hopefully, this is consistant with that you have been exposed to lately. First of all, and I'm going to talk about these devices in the order that we see ourselves using them as of the morning. First is a parasol device that's under development here at JSC. It is a mechanically or manually deployed umbrella or parasol. It will be put out through the scientific - the sun facing scientific airlock on the sun side of the workshop, which is ordinarily used for projecting certain scientific instruments. We are planning now to divert its use on the sun side only. There is an identical lock on the Earth-looking side through which many of the experiments can be conducted. We are planning to divert the use of that scientific airlock to deployment of this parasol-type device. It, the parasol device, I think some of you may have seen sketches in a release. It's approximately 22 by 24 foot, roughly very close to square. It's an asymmetric square, if you will, as far as its deployment point is concerned; that is, it extends further back than forward in order to cover the former meteoroid shielded area. In its erection, fortunately the scientific airlock, certain experiments had a pressure tight canister which extended well into the volume of the workshop. It's possible now to place the collapsible umbrella in that volume, possible for the crewman in shirt-sleeve environment to extend this umbrella device much the same as he would selected of the other experiments. The device has, when retracted, fits into a volume about 8 inches square, as I remember, 8 inches round. It has telescoping poles. The telescoping poles are extended by the crewmen inside pushing a rod through static seals, just as would be done with ordinary experiments. The pole that he pushes on has several lengths. So as he reaches the extremity of one section, he adds another until he's out about 25 feet from the surface. At that point, the umbrella is released by its disengagement from its confining collar and it erects much as an umbrella - a square shaped umbrella without a bow in it, by the way, would do here on Earth. Okay, so much for that device for the moment, and we'll come back and talk about it in detail later, but let's catalogue the others. The -

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DISHER The second device, twin pole, had previously been called twin boom. They are one and the same. This is the device that is under development at Marshall Center. It is manually erected also; it entails the crew exiting from their normal EVA hatch much as they would do for a normal ATM film retrieval. They are ascending the ladder that goes to the film station on the ATM. They will attach a new foot support, foot restraint, on that ladder. They will attach a fixture through which they will manually assemble an A-frame that will extend from that point on to the back of the meteoroid shield. The A-frame has on the end of it pulleys and lines so to speak. The - upon completion of the assembly of the A-frame, an accordian-like unfolding sail is pulled out by the crew to the full extended length; again affording about a 22 by 24 foot shadowing area over the workshop. The sail lines are then attached at that same station and the crew proceed back inside.

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DISHER Now these two devices we firmly plan to carry, with one proviso that I'll mention in a moment. We have the possibility - the strong possibility, I would say at this point, of carrying one or the other of two additional devices. The first is the CSM standup EVA deployed device that we had originally thought would be our first choice. As we proceeded, the parasol approach appeared simpler, more attractive. We, therefore, said we're going to work the parasol first; however, the standup EVA still has many attractive features, among which are extreme light weight, small size, small volume; so it could well be carried as a second backup, if you will. A - there is an alternate approach to the parasol. The parasol I described is a mechanical, unbrella-type device. There is a similar inflatable type device. Actually, there are two variations of an inflatable device that serves the same function. One - both of these are under development under the cognizance of the Marshall Center. One is being done by our Langley Research Center. The other by Marshall contractors. Both of these inflatable devices use inflatable structures of a type that take - they take a set - that is, they do not rely on internal pressure for integrity. The pressure is there to inflate them, but upon inflation, they take that set and thereafter do not require further pressure integrity. Now we think, at this point, that weight and volume will allow us to carry one or the other, depending on their final status tomorrow evening. There is, further, the possibility that the - one or the other of the two inflatable devices could supplant the parasol as the scientific airlock deploy device. I say that's a chance. It's certainly not a strong likelihood at this point, but I wanted to advise you that there is that chance. So recapping on the several devices, it is our firm plan to carry these two. It may well be possible to carry a third. Which of the third will be carried will be determined tomorrow - late tomorrow. Now let me talk a little bit about the weight of the devices. The mechanical parasol weighs a total of about 95 pounds. The twin boom, twin pole scheme weighs a total of about 112 pounds. The SEVA sail weighs about 30 pounds. The alternate inflatable device I don't have a firm estimate for at this point. It exists. I just don't have it at the tip of my tongue. I would guess that it's in the same order as the parasol, perhaps a bit lighter, being an inflatable structure. The fabric that will cover is a fabric made by the Sheldol Corporation. It's the layer of nylon called ripstopped nylon, which means nylon with reinforcements in it so that it won't tear, a layer of Mylar, and a layer of aluminum. The aluminum side goes down. This is not an actual to-scale shield but simply indicate the manner in

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which it would be deployed directionalwise. Now I guess with that, I'll open to questions. Yes.

QUERY Could you tell us why the twin pole weighs as much as it does? And, also, I'm a little confused on the parasol because I looked up the weight of the T027 experiment in the book, and it was 270 pounds. Of course, I guess that included a lot of things that you might have taken off, but if you could go a little bit more into detail on that, I'd appreciate it.

DISHER Sure. Okay. The reason for the weight of approximately 112 on the twin pole is primarily the long structural run of the A-frame, which needs to go from here, clear down to here. They're approximately 1-inch diameter, aluminum tubes, that and the end support, the work station, the foot restraint, and the total length of line plus the total area of the thing just add up to that weight. But it's primarily because of the long structural run with tubular members that have to extend that total length. Let's see, I think it's about 50 feet, but don't hold me to that. You can scale it if you like. Now your second question was the weight on the cell compared to T27? The weights? Yeah. The weights I'm talking about are, of course, incremental to what did exist for T27 as far as its structure was concerned, and we fit this device within a slightly modified structure that's - that was used for the T27 experiment. And the weight that I'm talking about is incremental over that which had been there for T27, and it is, of course, a quite light weight device that does not have a long cantilever run on it. It has a central support, as versus, say a long cantilever run.

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DISHER - - and ah - It is of course a quite lightweight device that does not have a long cantilever run on it. It has a central support as versus a long cantilever run and that's why it can be somewhat lighter. The tubular supports here are on the order of a half inch; well, no they're about 5/8 of an inch, as I remember. And that's representive of an umbrella type structure.

PAO Angus.

QUERY Two. First of all, that material you were showing us, is that the material for all these types of devices or for just one. And secondly, assuming, is it right that the - assuming even if you did carry a backup, the SEVA sail as a backup, you would first attempt to deploy the parasol from inside the workshop and could you give us some sort of timeline when all this might have happened. Which day would you do - do you think you would do the SEVA deployment if you do do it?

DISHER Okay. We will, as our plan now exists, we will try the parasol deployment first from inside, that is our plan. The fabric that I described is firmly that used in the parasol and the SEVA sail and at the moment I'm not positive that the - that it's the same fabric used here. I know it's not the fabric that's used here. This device uses a different kind of material that's adaptable to inflation. Your other question, the timeline for all of this. The parasol would be erected on day 2, as I recall. And if that were not successful we would immediately proceed into the twin pole deployment at as early an opportunity existed. The - This inflatable device is obviously a backup to this one since it would - if this failed and if we had this, we might try them in sequence but that's speculation at this point. The SEVA, as we see it, if carried, would be the last that we'd try, as we now see it.

PAO Bruce.

QUERY Yeah. A couple of things, John. First of all, I've been told this morning that the inflatable device being developed at Marshall, not the Langley Research, has been scrubbed, that it does not work in test. Go ahead with that one first, please.

DISHER Okay. That's possible, you may have more recent status than I. I attempted to qualify my statements by saying depending on their state of readiness. That's why I firmly checked these and I should, perhaps, put a question mark in addition to and either/or on the last category.

QUERY And you said a minute ago that it might go to the twin pole as, or, which ever is immediately - I understood that would be day 3 if you could not do the parisol or any of the scientific airlock methods?

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DISHER Okay. I can't tell you if the parasol deployment were not successful with that on the first try. I can't recall, now, our precise time and when we'll be able to do the twin pole. I'll get that for you.

PAO David.

QUERY Yeah. Three questions. First of all, what kind of provisions have you made, for instance, if the parisol partially deploys and doesn't deploy all the way. Do you have a way that you can sort of jettison it and then try something else? And secondly, why the orange side up? And I have one more after that.

DISHER Okay. Let me take the second one first. The thermal characteristics of a shield like this are two-fold. First, there's the absorbtivity of the material, how much energy that it will absorb. Secondly, there's the emittence, how much energy does it radiate? And the ratio of these is the important factor. When you're looking at the sun you want to absorb very little and emit a lot. If you're looking at the body you're trying to protect, you want to emit a very little. Now, this orange shade is a great radiator, it absorbs more than the aluminum but it radiates much more. So, in terms of ratio, the important thing is the side that you want to look at the sun. Now, the other side, the shiney side for the same - it's a poor radiator, so, even it if does get relatively hot itself, it's not going to pass much heat on to the workshop structure. Does that follow?

QUERY Yeah.

DISHER And your other question, please.

QUERY The second question was, if the astronauts go ahead and try and deploy this parasol - -

DISHER Oh, yes. Was it ejectable?

QUERY Yeah.

DISHER Yes, the T-27 experiment mechanism has a provision for ejection of a faulty mechanism and it's our goal to have that in this device also. I believe we have that, I'm not a hundred percent certain at this point. I believe we have the ability to eject a faulty device.

QUERY And, one other a little bit more for general question. In the past few days we've seen a cycle of changing design concepts ah -

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QUERY And one other, a little bit more general, question. In the past few days we've seen a cycle of changing design concepts. Like at one time this looks like the SEVA was the number one and now the parasol. And we've been kept up to date on what these changes are, but we haven't really been filled in on the reasoning behind these various changes.

DISHER All right. Let me take a crack at that. I alluded briefly to that, but let me cover it a bit more. As you say, originally we thought the standup EVA deployed device would be the most attractive, and one of the reasons was that you could do it earliest before you entered. And obviously that was advantageous; however, as we proceeded to analyze the actual SEVA operation, it looked like it could take more time and, in particular, could entail more RCS propellant utilization than we'd like. And that's not a problem as regards the consumption, but it could be a problem as regards deterioration of this very important radiator at the surface of the workshop, which cools the - provides the freezer for the food. The emissivity of that radiator is very important. The exhaust products could have a slight deteoriating effect there. The longer you are there, of course, thrusting, the more that effect could be. That's not a major concern, but it is a consideration, certainly. Similarly, up at this end when you're attaching the forward end of the sail, there is some concern about contamination on the solar arrays. But, by and large, it was an assessment of longer time, more complexity in the deployment than we had initially estimated. At the same time, the parasol device which originally had been a kind of a long shot - we thought it would be too complex a device to get developed and built in such a short time, has come on strong, and we're optimistic that we can do that. And it is very simple. One of its big merits is that it uses the same procedures that were used in the T27 experiment. So the training is a very minimal thing.

QUERY One time before we were told that there was a certain amount of doubt as to how operational the SAL was. Has that situation changed?

DISHER I think that was - perhaps someone was - possibly, someone was forgetting that the SAL was always designed to operate in the sunlight. Someone may have been thinking that the absence of the shield could have over heated the SAL, but the SAL, of course, to do its function, was always exposed to the sunlight. It's always possible that there could have been some damage done to it mechanically, although that's very unlikely, and there should not be any thermal problem because it's designed to operate in full sun. In

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other words, it had a hole in the meteoroid shield for its operation.

QUERY If, by chance, that there is no provision to eject, say the parasol or the inflatable device or whatever would be erected through the SAL, and it fouled up, could either of the - either the twin pole or the SEVA sail be erected above it or around it, or could they do a SEVA to pull off what's there? And, also, would you describe the inflatable device from Langley, how it operates? All we're told it's pneumatically inflatable, and that means nothing to me.

DISHER Okay. On your first question, we are going to carry several special tools, including a cutter that can be operated from the end of a pole. That will be a contingency kind of a tool. It'll be carried incase we find remains of the solar array or the meteoroid shield that would interfere with operation. And depending on the site assessment of the feasibility of removing that debris, there are - they're basically adaptations of lineman's tools, used for high tension kind of work, similar distant kinds of rigging. There will be tools, including a toggle-type cutter, that could simp that pole off, as an example. So we are going to prepare for that - for the contingency that we could have something projecting that would interfere with the other deployment. Your other question, please.

QUERY The Langley inflatable device.

DISHER Oh. Okay. I'm afraid I'm not able to describe that to you. I've not seen it. It has been described to me, but I'm afraid that I would not do it justice.

QUERY Well, is it any, do you have any idea of - is it anything like the liferaft concept from Marshall, or is it a completely - is it a balloon or, you know, something like that?

DISHER Yeah. I believe that it's a layered -

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DISHER I'm sorry, I'll just have to - I'll be happy to get with you afterwards. I just can't describe that one to you. I just don't know.

PAO We'll take one more here and then we'll switch to the Cape, and then come back.

QUERY Could we have at some stage, now if, of course, as happened, what is going on at Marshall, what exactly is the crew deploying under water at Marshall, and, maybe it's already happened, but if it hasn't happened, could we please have a rundown as soon as possible on how it's gone, and what they've done, and preferably with the the addition of a few quotes from Conrad on thermal shields, generally.

DISHER Okay. Right now the prime crew at Marshall are either in a process or getting ready to evaluate these two devices under water. The parasol and the inflatable device are not - one of their virtues is, as I mentioned earlier, is that they don't require a special training. They use the same procedures, generally, that we've used in the experiments. So the prime crew is in the process of working these underwater, with appropriate simulations right now.

PAO Okay, we'll take questions from the Cape now.

QUERY Can you read me? If the parasol, or umbrella deployment is successful, and we all hope it is, what impact would that have on such experiments as S183 - that's S183, S073, and S027? And could part or all of these experiments be salvaged by rotating the Skylab?

DISHER Okay, to answer your first last, no, it would not be feasible to roll the Skylab completely for conduct of those experiments. But there are several exeriments that are eliminated by this operation. They are the Sun-looking experiments, S020, which is a solar astronomy experiment. Part - there are several experiments that, in their original protocol, looked both on the Sun and the Earth side. The Sun-looking part of their protocol would now be eliminated. They still have the Earth-looking side, which, you might say, half of their protocol will have been wiped out. Let's see, 183 is not affected. That's the Earth-looking, on the Earth-looking side.

QUERY Okay, for example, if Skylab 2 goes well, does NASA still plan to go ahead with the launch of Skylab 3 and Skylab 4 on August 8 and November 9, respectively?

DISHER The timing, I think, will remain open at this point. I would see no reason to say that those dates would change, and certainly when Skylab 2 goes well, and we fully expect that it will now, we will expect to proceed with 3 and 4.

SL-1 PC-20F/2
Time: 10:03 a.m. CDT
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QUERY On the problem of heat, why was a 120 degree Fahrenheit maximum temperature readout set on the temperature sensors and why are these readings going off-scale - why wasn't this excessive temperature anticipated? Does a 150 degree temperature sensor, for example, cost more or weigh more than an arbitrary 120 degree cutoff?

DISHER No, it compromises your accuracy. When one selects instrumentation, you make a choice - a judgment on the maximum range you'd like to cover all contingencies versus the accuracy you'd like to have in its normal range of operation. And generally you strike a compromise, and that's what the 120 degree limit represented. If you chose a 150 degree full scale, your accuracy under normal conditions would, of course, suffer.

END OF TAPE

SL-1 PC20G-1
Time: 10:03 a.m. CDT
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QUERY Just how close are you to getting these things - how tight are you to getting these devices to KSC for that 1:00 p.m. Wednesday deadline that you apparently have now settled on?

DISHER Okay. The first two devices that I spoke of, we think we're in quite good shape for getting them there late tomorrow. I'm not aware that it's, necessarily, a 1:00 o'clock tomorrow afternoon deadline, but in that vicinity, certainly. The standup EVA sail is also in condition to make that delivery, and the inflatable device is a question in my mind at this moment. I just don't happen to know its status.

QUERY Well, originally, there was a noon deadline set, a noon deadline Wednesday for getting everything here, so that it could be checked out and so on and so forth, in time for Friday morning launch. Has that slipped, or was I mistaken?

DISHER I'm just saying, I think it's a little bit later than that Wednesday. But, essentially, mid-day or early afternoon Wednesday. The final stowage itself - I beg your pardon?

QUERY - - after the startup of S-183, the UV panorama experiments.

DISHER It is not affected by the use of the scientific airlock.

QUERY According to the information here, and I have an experiment data summary in front of me, 183 does utilize one or both airlocks. The reference directly is to the plus-Z side or the sunside airlock.

DISHER It looks out the Earth-looking side -

QUERY Two more general questions. Are you more than 50 percent sure that you can launch Skylab 2 on Friday? And second question, what is the most crucial problem which might cause you to postpone the Friday launch?

DISHER Okay. With regard to the probability, we have a number of tasks that are proceding today, tomorrow morning. It's a very tight schedule. I won't try to put a number on it at this point. We're very hopeful that we can keep that date, and as of the moment, there are no reasons that say we can't. And what was your second question, please?

QUERY What is the most crucial problem right now, which might cause you to postpone the launch?

DISHER Simply the tightness of the schedule.

QUERY I gather you're going to start the countdown clock on Skylab 2 and then stop it and start fiddling around with it and jump it all over the place. Primarily, as I understand it, to reload the CSM and to save batteries. What do you need? You only need about 22-1/2 hours actual countdown, don't you?

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DISHER We can do the final last item stowage as late as about 10 to 12 hours before launch. That's -

QUERY I have three questions. How close _ the OWS skin will the parasol be after deployment? Number 2, will the crew carry a helmet visor and EV gloves in the CSM? And number 3, could you please expand on the visual characteristics of the parasol side that faces the sun?

DISHER Okay. It will be - Let me go through the sequence of its deployment. When it's initially erected, it will be approximately 25 feet out from the surface. The crew will then draw it in to a space a distance about 2 feet off the surface. Actually, that distance could vary in the range of 1 to 4 feet. We're making calculations right now to determine what that optimum spacing should be. The crew will, then, remove the projecting rod, the unused part of the rod, that would project inside the work space. Your other question, please?

END OF TAPE

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DISHER Your other question, please.

QUERY Will the crew carry a helmet visor and EV gloves in the CSM?

DISHER Yes. And you asked about visibility of the outer surface of the sail?

QUERY I just wanted you to expand on the visual characteristics of the parasol side, which faces the sun. Like what kind of an orange is it - is it very very shiny?

DISHER Oh, okay. It's like an international orange, or I guess like a Florida orange, of course, like Florida. I mean international orange in the flag scale. In fact it is very much like a Florida orange I guess or a California orange.

PAO We have no more questions at the Cape?

QUERY Will the crew also carry a helmet visor and EV gloves in the CSM?

DISHER Yes, they will.

PAO Okay. We'll take questions back here in Houston now. Abbie.

QUERY Are you still planning to have the crew clear away the debris and try to fix the solar panel on day 1 in that SEVA?

DISHER They will make an inspection and if it is necessary to clear away debris they would either do it immediately or dock - soft dock if it looked like an extensive job, soft dock and then come back and clear the debris. The question of attempting to dislodge a stuck solar array, we're fitting the tools that we anticipate could be useful in that regard. It will be up to the discresion of Pete with discussion with the ground based on what he sees whether such an operation would actually be attempted.

QUERY Would that operation take place on day 1?

DISHER Not likely. It's not likely that deployment could be done on day 1. The - a simple debris cutting might be but here we're speculating on what the visual inspection would show.

QUERY In other words you would try to do the thermal shield before fixing the solar array?

DISHER Yes.

QUERY I'm getting confused about the changes in the flight plan. Does it go like this now, liftoff 7 hours later, look around still pressurized and then a soft dock and then a consideration of whether to do another look around, whether to do a SEVA and a solar deployment.

DISHER Okay. First up, a visual inspection. If there were extensive debris operations necessary that look like they are going to take the greater part of a Sun pass then

SL-1 PC20H-2
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the crew would likely dock, soft dock, sleep, go back the second day and remove that debris. If there were no debris they would immediately after the fly around go to a hard dock, proceed in - go through their sleep and then proceed into the parasol deployment.

QUERY I'm sorry. Two things I forgot earlier. First of all, could you speak a little on what constraints, assuming that this parasol is successfully deployed, what constraints that would have on maneuvering the vehicle, I mean from solar inertial to other attitudes; and secondly, could you just clear up which panel it is you think you may be able to deploy and which one you suspect may be damaged? Which is the one that you are thinking you may be able to deploy?

DISHER Okay. On the deployment as you look at it, this is wing 1 on your right, wing 2 on your left; and I'm going to look back and tell you later which is which because I've forgotten which is 1 and which is 2.

QUERY And the maneuverability of the vehicle - the maneuverability of the vehicle with the parasol deployed?

DISHER Oh, yes. Yes. The accelerations are very - very nominal and that was part of the structural analysis to determine that the integrity would exist. It was called to my attention that I didn't - I did talk about the CSM deployed sail but it did not come through to people in the Florida end. I wanted to make sure that everyone understands the third item on my chart. The so called SEVA sail is that device deployed from the CSM. It - the deployment would be as we had talked about it last week with the CSM maneuvering, attaching the sail at two points in the back, proceeding forward to attach it at a third point forward, snubbing it to form a complete sunshade, much the same area although slightly different shape than that described as the ATM station deploy. So I'd like to insure that everyone understands that is an alternative that remains a full alternative that we're weighing in addition to the two that we firmly plan to carry.

QUERY A couple of questions. The first about this parasol. The crew obviously won't be able to see what they are doing when they deploy the parasol - or do they know that it's in place - properly in place?

DISHER Well it turns out that from the command module you can get a pretty good view of it.

END OF TAPE

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When they deploy the parasol, how do they know that it's in place and properly in place?

DISHER Well, it turns out that from the command module you can get a pretty good view of it. We're - You see, from the docked command module, a quite good view will exist. And ah - -

QUERY (Garble) to watch it?

DISHER That is open at this point. I suspect that we will. But, certainly, one can go back later to look or can look at the same time.

QUERY Second question. If they use the three pole arrangement, won't the presence of the tubing and the sail and what have you - won't it interfer with the ATM EVA, especially when they go to the sun end of the ATM to retrieve the stuff there?

DISHER No. It's really not an impediment; it's very simple to step around it in going to the ATM film or cable station.

PAO Peter.

QUERY Do you have any results from investigating the original cause of the anomally during launch? What made the shield come off in the first place?

DISHER I don't, as of this morning. Engineering evaluations are continuing. I don't have anything further to add to that I said last week, wherein a structural failure appeared at 63 seconds and that is near the time of maximum air dynamic loading, and it could well have been a structural failure associated with a combination of vibration and the structural loading at that moment. That will be determined in due course, and I'm confident - we just don't happen to know yet.

PAO (Garble)

QUERY That's for me. I wonder if this delay has compromised the M071 mineral balance study in any way? As far as the crew is concerned, have they maintained their diet and sampling and so forth, during their training period here, and going to Huntsville, and so forth?

DISHER Yes. They have maintained their diet. We have had to make some compromise in the basic protocol because of the calendar considerations. But, by and large, the protocol has been maintained, and, in particular, the diet has.

QUERY I wonder if you can comment on things which might have had to be removed from the CSM to allow space for these things you're going to have to take, and, specifically, a resupply cooler that was to return some data at the end of this mission.

DISHER Okay. There are several things that have been removed because they're no longer feasible. For instance, the several items of equipment and film associated with several of those experiments that were obviated by the thermal shield. There were several devices which were quite desirable, but in today's priorities were not essential. For instance, several small computers, hand computers, for the use of the crew on board in working contingency problems and the like. Those are example items that occur to me.

QUERY What about personal preference items?

DISHER The very small allowance of personnal preference, which is a very minor weight and volume allowance, has not been compromised at this point.

QUERY And the resupply cooler that I mentioned, do you know about that?

DISHER That doesn't ring a bell with me. resupply cooler - there is the provision for - I'm sorry, resupply cooler doesn't ring a bell with me. Could you amplify that?

QUERY Well, at least one student experiment might be affected by this. Something that was to be returned - -

DISHER Oh, okay. I'm with you, I'm with you. These were heat sinks, so to speak. Just cold bricks, if you will, to - that were put in the freezer and then provided cold storage for a couple of items on return, and, to my knowledge, those have not been compromised.

PAO Bruce.

QUERY I want to follow on her question a minute, John. You said the handheld computers; I guess there's about three, or so, of those - are you talking about the small 3 or 4 inch long and a couple inch wide?

DISHER Right. Together with it's packing. In each of these cases, of course, the packing does entail some weight and volume too.

QUERY It just seems that that wouldn't be as heavy as personal preferance kit items. I'm just curious why these were deleted and other things, not specifically items - the personal preferance kit, but other things weren't. The handheld computer just doesn't seem to be very big to me, even with the packing.

DISHER It's an item that would be nice to have, but we consider not necessary.

PAO David

QUERY Can we - Do you have any information on the thermal simulations at Marshall and how they are being used to figure out the present problem with the coolant loop and the food lockers and how accurate the thermal simulation models have proved in the past? And I take it that these models are what you based the size and the characteristics of the - you know, of these heat shields on. I just want to know

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how accurate is your model predicting temperatures and so forth?

DISHER Okay. The thermal models are in very active use at both Marshall and here at Houston. And it was on the basis of these that we concluded we had to cover the whole area of the - the area formerly covered by the meteoroid shield. Initially, it was our thought that if we covered the area completely with an effective shield such as this, we could have the problem of overchill. We don't - based on the calculations from those models, we don't think that's the case, currently. We estimate that the temperature would cool down from approximately 115 degrees, 110 degrees in the cabin, down to about 70 degrees in approximately 12 hours, as I remember. And those kinds of answers come from thermal models and computer calculations.

QUERY Well, now you've been operating the Skylab for a period of time in a number of different attitudes, it would seem to me you would be getting - have made a series of predictions on certain temperatures based on these thermal models. I'm just wondering how well, how accurate are these thermal models proving out to be, in your experience at this time?

DISHER Okay. The - We're talking about inside air temperatures, which have a - -

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DISHER ... inside air temperatures which have a very substantial lag to them because of the whole mass of the system. It's quite easy to calculate a sustained condition temperature. It's quite a bit more difficult to accurately calculate the internal temperature response to attitude maneuvers that are made every several orbits or so, but we can predict qualitatively what the effect of a particular maneuver will be. That it will cool the interior on the order of 5 degrees or so. I don't think that we could say that a computer program would precisely predict that answer because of unknowns of a quite complex equation in a transient state of attitude as versus a steady state.

QUERY In other words you really don't know yet how accurate these thermal simulations are?

DISHER Under a transient condition of attitude that changes every several orbits in a manner that we had not originally planned, we can't compute the internal temperature closer than about 5 degrees say. We know that it will go up or down. We use those calculations in the attitude that we plan. We use them in determining the size of the sunshade that we'll put out, but we can't calculate them with the order of 1 or 2 degrees as we can measure them. We have the data, measured to a fraction of a degree, of course.

QUERY Earlier the plan was for the crew to fix that one solar panel and now they're going to do the thermal fix first. What was the reasoning behind the change?

DISHER I'm not aware it was a change. Okay. All right.

PAO Okay. We'll go now and take some more questions at the Cape and then come back.

QUERY First. Why is there water in one cooling loop an antifreeze or Coolanol in the other, and second, when will the detailed or revised flight plan for SL-2 be made available?

DISHER Okay. The coolant fluid is tailored to its requirements. For instance, a freezer loop which has to cool food to below zero has to use a liquid other than water. Coolanol is one of those liquids. Water is used where the normal temperature range is above 32 degrees and less than the boiling temperature. Water, of course, is easier to work with in a number of applications. We use it where we can. And the other questions was when would an accurate time -

QUERY I'd like to know why, particularly in view of NASA's previous problems with personal preference kits, why the personal preference kits for Skylab weren't the very first item taken off the spacecraft when you had to look for things to remove. And I have two more questions after this, please.

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DISHER Okay. Well, we will certainly reexamine that.

QUERY Okay. The second question is: where is the parasol being tested? I understand it is not being tested in the water tank, but at JSC. Is that correct?

DISHER That's correct. The parasol is being tested here, correct.

QUERY And the status of that testing?

DISHER It's continuing.

QUERY And the status of that testing at JSC?

DISHER I'm sorry I did not hear.

QUERY What is the status of that testing at JSC?

DISHER Okay. It's been underway for several days and it's continuing. We expect that the testing will be complete by tomorrow morning. As for as the flight article is concerned, some additional testing will continue afterwards to determine if there are any idiosyncrasies that we should know about in the flight deployment.

QUERY And the last question is: I'm just not sure if I have you clear. Do I understand that what you're going to do is go up there, look around, then if there is any debris you're going to soft dock, and you're going to eat and sleep, whatever you're going to do, and then you're going to get out and clear off that debris; and then you're going to hard dock, you're going to go into the airlock, you're going to deploy the parasol and then after all that you're going to get back into the command module and undock and go back and try to pull the panel free?

DISHER No. We do not know for sure that we will try to release a solar panel. That will depend on the original inspection and Pete's report and discussion with the ground. If the deployment were considered feasible we would then make a real time decision as to if it would be attempted, when it would be attempted in the mission, or possibly might it be attempt - deferred to the second mission. There is no certain plan as regards the solar - the freeing of a stuck solar array. It will depend on what we see when we get there.

QUERY Okay. I'd like to repeat my question I asked earlier about when will the detailed revised flight plan for SL-2 be made available? And second, yesterday afternoon at the 18:00 briefing, the food experts said that prolonged heat in excesss of 24 hours would probably compromise the food onboard there. What is the present status of the food?

DISHER Okay. The attitude of the spacecraft has been changed to bring the temperatures down from their

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approximately 120 degree level. The temperatures, I believe are - I should say from their approximate 125 degree level that they were yesterday. I believe that the temperatures are currently in the 115 to 120 degree range. The timing of the flight plan release, Bill, when would you expect that that would be printed and available?

SPEAKER As soon as we can get our hands on it.

DISHER All right. I would guess the morning of launch would be a fair estimate at this point. We're talking about availability to the press that is I presume.

SPEAKER Yes. Soon as we get it.

DISHER Yes.

PAO Is that all from the Cape? Okay, we'll come back here for questions. We left Abbie hanging in the middle of one here. I'm sorry.

QUERY It's the change that - you have sort of abandoned planning to fix that solar panel for this first mission, is that correct?

DISHER No. We've provided the contingency tools to do it if it looks like a simple job so that we could make the decision real time to go ahead and do it -

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provided that contingency tools to do it if it looks like a simple job, so that we could make the decision real-time to go ahead and do it and fit it into the plan.

QUERY But you haven't put it in the flight plan the way you have with these thermal fixes.

DISHER That is correct.

QUERY And has the crew simulated fixing the solar panel in any of the simulators?

DISHER They have - they worked with the tool in a simulated structure that duplicates the solar array fairing just to practice the use of the tool, and that's being done under water at Marshall.

QUERY There was some talk about Pete Conrad flying to California to look at the solar panels. Is he still going to do that, do you think?

DISHER That was considered - I don't think that it's currently in the plan.

QUERY There has been some, from our point of view, quite dramatic change about the solar panel deployment which has just sort of come out by the way. I mean, can you tell us - has it been decided that this is too dangerous to do?

DISHER No, no, it is not. That would depend on what we see when we get there.

QUERY There has been, but perhaps I've been misunderstanding all along, but there has been some change, some crucial change in the whole plan, hasn't there? This was to be the first thing to be done; so now you've decided, for some reason, you're not going to attempt to deploy the solar panel unless it's fairly easy, and you're going to have a 28 day mission - we're back to, presumably, 17 days of work and 11 days of doing nothing, for lack of power, is that right?

DISHER Well, addressing the power first. With the power that we have, we think that a duration approaching 28 days can be attained. With regard to the part that deploying one of the workshop solar arrays plays in the - plays in our thinking, I think we're - I don't interpret that there's been a major change there. e've all along talked about a contingency providing for that, depending on what's seen on sight. It's - could you - could you elaborate on your - you're talking about change from what?

QUERY Yes. I'm sorry. What I was saying is now it looks very unlikely there will be a solar panel deployment on the first mission. Therefore, presumably, we'll be back

to the situation we faced a week ago when we were told there'd be 17 days of fairly serious experimental activity and 11 days doing very little to conserve power.

DISHER Okay, I missed your comment. You are adding up to 28 days with 17 - yes, if we are, in fact, not able to deploy a solar array, we do have a reduced power profile in the latter part of the mission. That is correct.

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PAO Okay, one last question from Peter.

QUERY Has anyone voiced any concern at all over the likely condition of the crew on Friday, after all this intensive training of the past few days?

DISHER Well, certainly, they will undergo a minus-2 day, a minus-1 day physical at the Cape, and, certainly, the medical team will take that factor into account in the examination.

QUERY Has there been concern expressed at this stage regarding that? Perhaps easing up on their training in some way or even considering a slip again on that account?

DISHER Well, they were given a light day on Sunday, if you will, from that standpoint.

PAO Okay, thank you very much.

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SKYLAB NEWS CENTER
HOUSTON, TEXAS

Change of Shift Briefing
Johnson Space Center
May 21, 1973
4:30 p.m. CDT

PARTICIPANTS:

Milton Windler, Flight Director
Craig Staresinich, EGIL

PC-19

SL-1 PC-19A/1
Time: 16:30 CDT
5/21/73

SPEAKER ... this red light.

SPEAKER No, I don't know about that.

SPEAKER Okay.

SPEAKER If you want the Cape, there it is, right there.

SPEAKER Okay, but when you get questions from the Cape, don't start your answering until the red light comes on because, they have got to do a lot of switching.

SPEAKER Wait for the red light?

SPEAKER Wait for the red light.

SPEAKER You start on the red.

SPEAKER Right.

SPEAKER Okay, we'll get started with this change of shift briefing. Participants are Flight Director, Milt Windler, and Craig Staresinich who is the EGIL on Mr. Windler's shift, that's Electrical, General Instrumentation and Life Support Officer. Milt, do you want to give us a summary of your shift, please?

WINDLER Okay, I guess the first thing I ought to say is that what EGIL really stands for is one of the greatest jugglers that's been around since I saw that guy do his little thing with The Harlem Globetrotter half-time show with all his little balls and everything, because he's been juggling the power requirements and the heating requirements and cooling requirements and everything else to try to make the spacecraft stay in a stable condition until we can get the crew up there to make some changes or fixes that improve the situation. And let me also say that if you folks have been through at least one of these press conferences you have been through one more than I have. So I have really not kept up with everything that's been said to y'all and Jack, if I make any mistakes you kick me now, if I say something that has been said differently by somebody else. But basically I plan to tell you what we've been doing today. And I've been spending really all of my time in the Control Center, on the console and have not been participating in the training operation as y'all are probably already well aware of. And Craig is in the same situation. We were one of the teams that has stayed in there, and I've been in most of the nights and I guess have gone directly home or something and not come over here and briefed y'all. I think most of you are interested any way on what was going on with the planning. But basically, as you are aware, we are- we're doing this juggling act and in fact we are trying to control the spacecraft attitude through, or the spacecraft temperature I should say, through a series of attitude maneuvers. It's com-

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pounded by the fact that we have these strap-down rate gyros and they have a current, you might call it, drift. They are designed to, as you have probably been told, to be updated every rev by aquiring the Sun through the Sun sensors and removing the errors that have accumulated over the back-side night time pass. Of course we haven't seen the Sun with these sensors for several days now. I couldn't even tell you how many to tell you the truth. And we have a continuing drift problem because we've been unable to update the computer's knowlege of what the drift rate in the gyros is. Consequently from time to time we have to change the attitude of the spacecraft just to keep it where we really want it, and we've been doing that. Plus there's additional attitude maneuvers that are required to make the spacecraft do different things temperature-wise, either cool some part of it or heat some other part. Don Puddy probably told you of some of the attempts that were made to heat parts of the spacecraft. And I'm not really going to go into a lot of detail personally. I'm going to ask Craig in just a minute to tell you of some of the things we are concerned about, and how we're managing them. But basically, we're using three references instead of the standard - you might call it attitude inertial references. We are using a temperature on the other side of the workshop that we are trying to balance equally on left and right sides so we know that we are in the right roll attitude. We're using the power output of the solar cells to determine that we are at the right angle, pitch angle, with respect to the Sun. And we're using a momentum state to determine if the spacecraft is actually in the orbital plane. And those are the cues that we're using and you may already be familiar with those. Craig, why don't you tell them a little bit about how you are managing the systems that you're concerned with, and then we'll stand by for questions.

STARESINICH Okay, originally I think the two big systems we're trying to manage are the ATM power systems and the OWS thermal systems. We tried originally to get up to a pitch attitude that would - -

END OF TAPE

SL-1 PC-19B/1
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STARESINICH We tried originally to get up to a pitch attitude that would cut down the incident angle on the OWS, the workshop itself, just enough so that we can get the ATM batteries charged at sunset. At that attitude, I think one of the big events was trying to keep the suit umbilical system water loop above 32 degrees to keep it from freezing. Now, today, we had to pitch down about 10 degrees, total, to keep the incident angle on the whole cluster - to increase the incident angle on the whole cluster so that we can get the suit loop to warm up or maintain a stable temperature. And, so far, we've managed to do that. At that lower pitch angle, the power system increases capability and we have no worries now. As a matter fact, we have excess energy as far as the power system goes. The OWS temps at the lower incident angle is - may increase slightly. We have - well, it's hard to tell exactly what it is now because, earlier, we did a 51 degree counterclockwise roll to let the suit umbilical system see the Sun for 1 daylight pass and brought it back again at the end of that daylight pass. With that, it sort of threw all of our - it threw our temperature trends off somewhat because the roll maneuver increased the temperatures on the other side of the spacecraft and decreased the ones that were seeing the Sun before. So, until they come back and stabilize again, well, hell - when they do we'll have a better handle where the stable temperature of the cluster is now. We've managed to charge one of the airlock module batteries, especially at this lower incident angle. We've gotten battery 7 up to 72 percent state of charge. And charging up battery 7 also increased, added some heat into the airlock module coolant loop, which also is a lower temperature we'd like it to be. So, I think, other than that, everything's pretty good.

WINDERL If it hadn't already been mentioned, you might mention one other point; that is, you've had to apply heat to the airlock module to heat the walls up - -

STARESINICH That's right.

WINDLER - that's required power which, until today, you haven't really had available, very much available to you.

STARESINICH This is the first day we've managed to keep the MDA wall heaters on for a full duty cycle. They are on all the time, and we have enough power to do that and it's heating up the MDA wall temps to a point where it - the hottest temperature we've seen yet because of this management scheme. And that should help the airlock module walls keep up also.

PAO Okay, before we take questions, do you have the spelling of Mr. Staresinich's name? It's Staresinich.

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Is that correct?

STARESINICH That's right.

PAO Okay, Bruce Hicks.

QUERY Yes, Milt or Craig, either one. The daily status report shows the average temperature in the living quarter area is 117 degrees, which is above what we've been getting earlier and there's been less concern. And, we understand that the - We were told in the last briefing that the readings were off scale - 120 off scale, which I guess wore wall temperatures in the food area. And, as I recall, I think it was off scale 120 when we started, believing there might be some outgassing and all. What further concern is there that there will be additional outgassing and how - at what point in time, before the crew enters, are you going be able to stop the outgassing or this high temperature?

WINDLER Well, we - First of all, the outgassing had to do with a temperature that was up around 175. It was a temperature - a different temperature. There is one thermocouple - I think it's the only one left, isn't it, that's on scale in that area. It's 105 degrees, so we really think that the temperature is - it is hotter today because, of course, we're at this lower angle - pitch angle, which means that the Sun's impinging more directly, more like a 0 degree angle on it, of course. Plus the fact that, as Craig already mentioned, we took a large influx of heat when we turned the - did the roll maneuver. So, there's no question but what the temperatures are higher, and it's also difficult to tell exactly how much higher they are. The best guess is probably somewhere around 125 to perhaps 128, 29 degrees along up in there.

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SPEAKER - exactly how much higher they are. The best guess is probably somewhere around 125 to perhaps 128, 29 degrees, along up in there. And the medical people have looked at the food situation and they expect - they have said it will be okay if we can just stay at these elevated temperatures for around 24 hours. So, we expect - if we - don't expect to have to do anymore roll manouvers and we think that the temperatures will gradually decrease in this area. And so we - but they are elevated today, that's right. I don't think outgassing is an increase. I really didn't - do you know that temperature off hand?

SPEAKER It's 175.

SPEAKER Still 175.

PAO Bruce.

QUERY One other thing. Exactly how deep is the concern over the coolant loops and if those - the liquid, I believe it's plain water in those loops - frozen in the loops and the lines ruptured, what would be the overall impact?

SPEAKER Well, we don't - first of all we don't believe that the temperature is down low enough to - it's not at the freezing point. The temperature transition that we're monitoring now is right near a heat exchanger that exchanges heat with the airlock module coolant loop. And I think that the prime concern is not to get that temperature down to the freezing point, because if you did and if something did break, the airlock module coolant loop has a chance of being damaged. Has a chance of being damaged because it's a heat exchanger - it could exchange heat with both loops. It's interconnected between the two loops.

PAO Arthur Hill.

QUERY Is that what you just described, your plan for reducing the temperature inside the cabin? There was a reference that Dennis made that you were going to be able to get the coolant loop warmer but still bring the temperatures down in the cabin by means of a new thermal manager plan which is being worked on, or something of that nature, and I didn't quite understand what he was saying at the time and I'm wondering if you do have some kind of magic new plan.

SPEAKER Who did you ssay said that?

PAO Dennis over the PAO in one of his commentaries.

SPEAKER Maybe he's talking about the ...

SPEAKER I guess I'm - I don't know of any hardware that's being proposed, there may be some but - -

QUERY I don't mean hardware, I meant some way of orienting the vehicle. Are you - -

SPEAKER I guess you're talking - well we need

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the model. There's no way I can hardly - we're flying along and I don't which ends following, to tell you the truth.

SPEAKER Well we're flying along the - well we're flying at ...

SPEAKER Who's going first? If I'm the Earth, then the Sun's over there. We're pitched up like this flying along like this with the OWS radiator shield down here. Now - at a negative beta, it's such that one side of the dark side is seeing deep space and the other side of the dark side is seeing the Earth. Okay. Do you want me to describe ...

SPEAKER I'll tell you what - well let's just put it this way - we're flying along and the Earth is kind of off to our right hand side, as opposed to being directly under us. We're proposing to just turn around and fly backward and we don't know if this will work yet or not. It's still being evaluated, but we're proposing to essentially turn around and fly backwards so that the Earth is off to the left side and the albedo will probably increase the temp - we think it will - or has a chance of increasing the temperature - and the thing that we're concerned about - it happens to be on the left side - all we're saying is we'll put that toward the Earth instead of putting it towards space and like I say, both the maneuver and the good that's done by the maneuver - our thermal deficiency - are being looked at. That's probably what he was referring to I guess.

QUERY Let me ask you if - how you would feel about keeping this up past Friday if there should happen not to be a launch on Friday and the decision was say to go 5 more days or so?

SPEAKER Well, we've - how many days have we been doing it now? We think we can keep doing it. It's - it's not - of course it's not the way you'd like for the systems to be working obviously but they are - we're in a stable condition we think and able to - we can't do anything very fancy but as long as we stay like we are why we can handle things pretty well we think.

QUERY Can you go over this cold problem again? What coolant loops are affected? How are they associated with this heat exchanger? What happens to the heat exchanger if they freeze? And what - did you see any rise in temperatures after doing this change in pitch and the roll maneuver?

SPEAKER Go ahead.

SPEAKER Okay, the two - to answer your first question - the two coolant loops that are affected is the suit umbilical coolant loop number 1 and the airlock module primary coolant loop. They interact with each other. The suit umbilical coolant loop dumps heat into the airlock module coolant loop

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which radiates out to space through the radiator. To answer your second question, the concern is of freezing the water - oh, by the way, the primary coolant loop has coolanol which freezes at a very low temperature and the suit coolant loop has water in it which freezes at 32 as you know. The primary concern is trying to - is freezing the water in the suit loop and possibly getting down to a solid state which may crack the heat exchanger. And if it does, it would depend on where it happens. It may or may not affect the primary coolant loop. And to answer your third question - the temperature's steady at this time. It's neither decreasing or increasing.

QUERY . . .

SPEAKER Well, the particular point we're looking at, it's about 34 degrees.

QUERY . . .

SPEAKER It's about as happy as 35. Or 36. No, it's not very comfortable at all. We'd like to figure out a way of increasing it and in fact we'd like to get it up around 35. I think we'd all breathe a lot easier if it was up at 35, but we're - the only way we can think - well we really - we don't know how to do that yet. We're - but we have stopped it from going down. It hasn't gone down in the last - -

SPEAKER In the last 8 hours, as a matter of fact.

SPEAKER Well, it hasn't gone down significantly though, I think, since about 2 days ago.

SPEAKER Oh, that's right. It hasn't budged. Right.

QUERY What temperature did it start out? In other words, what kind of a decrease have you seen?

SPEAKER It hasn't decreased very much. It started out a couple of days ago at not more than 36 degrees. It's been very slow, gradual decreases that we're wor - that we've seen, and - -

SPEAKER You might mention the other loop is about 38.8 or 39 degrees along up in there.

SPEAKER That's all right.

SPEAKER There's - there's - -

QUERY ...

SPEAKER No, there's two suit umbilical - suit umbilical cooolant loops. Number 1 is the one we're concerned about, the number 2 is about 39 degrees. Just to give you a feel for you know the kind of numbers that we're talking about.

QUERY What happens to the heat exchanger if it cracks?

SPEAKER I don't understand your question really.

QUERY Well, in other words, if the worst happens

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in other words, and the water freezes, and it affects the primary cooling - -

SPEAKER I guess we really don't know whether that would have any real damaging effect on the primary heat exchange or not. I suppose in the ultimate it could crack the primary. But I don't know that that's the case. You just don't like to freeze things. Like sometimes your car radiator will freeze and it doesn't hurt it any.

PAO Let's go to the Kennedy Space Center questions there, please.

QUERY The mission status report earlier today says that the serious concern, and they used those words, about the primary coolant loop was that if it cracked it would dump coolanol into the airlock. Now I'd like to know is that true? And number 2, what is coolanol? And number 3, what would be the effect of Coolanol being dumped out into the airlock?

SPEAKER Go ahead, answer.

SPEAKER Okay. The heat exchangers we're talking about is located in the external side of the skin. It's not inside the airlock module. Coolanol is a form of ethylene glycol, so it's almost like the antifreeze you put in your car. And the effect of dumping the Coolanol - I think you asked what the effect was if we dumped it in the airlock module and that's of no concern because it's external. And I guess the worst that could happen is if you did break it you'd lose that coolant loop and we'd be on secondary coolant loop at all times, which is no great consequence, because we can operate the whole mission on one coolant loop.

QUERY And the other question, I guess, goes to the PAO. Are we going to have a management or planning press ... to answer some of the questions which have just come up in the - -

END OF TAPE

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QUERY And the other question, I guess, goes to PAO. Are we going to have a management or planning person over to answer some of the questions which have just come up? In the last program director's status report such as the - now Langley is working on some kind of a device for a shield, a third one. We understand that EVA is out; that the primary methods are two techniques from the CL27 area. We just keep getting conflicting trends and no management person or planning person ever comes over to say what they are.

PAO I can't answer your question directly, Mr. Bloom. I'm sure that Mr. O'Donnell has heard your question and he is taking it into consideration out in the News Center. We'll have to let you know. I just don't know the answer right now, Mark.

QUERY I think that this is more or less an ad hoc. Is it possible that the result of the EVA that the prime crew will do tomorrow at Marshall Spaceflight Center could change options again? That means that the umbrella type device would be second again, and the sunshield would b5 first again?

PAO Okay, I've just been handed a slightly revised program director's daily status report and to be inserted ahead of the last draft is this sentence. "Current plans are to carry at least one SAL device and one sail."

QUERY We were told this morning that there were only two options left, and now you said "at least." That could imply that there are still three. Are there three devices to take up to the station, or should a decision be made before that that only two devices could be brought up?

PAO I don't quite understand the question, I guess. The latest information is what I just read on the insert. I have no further information than that at this time.

QUERY I'd like to know whether the command module could take up three devices, or if it's only possible to take up two devices?

WINDLER Let me - I really haven't been very involved in that. That's of course a hypothetical question and, certainly, there is priorities and trade offs. And there are things that are being taken in the command module that you could trade off if you chose to, but I don't believe there are any plans to do that. I think that the question you're talking about is not under real serious consideration.

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PAO Reg Ternal.

QUERY A more factual thing then. What time do we pick up the count tomorrow?

SPEAKER I don't have any idea. Do we pick it up tomorrow? I plan to be in trying to make the spacecraft work right, thermally, tomorrow.

PAO We'll get than answer for you Reg.

SPEAKER What day is tomorrow, Tuesday?

SPEAKER I think our interface with the Cape is very small at this point.

QUERY I'm sorry, I'm still concerned with your hot-cold problem; and that is, how can you hold at 34 degrees and at the same time decrease those temperatures in the workshop area?

WINDLER Well, I think what we're trying to say is that nobody really understands, at least they're working on this, but I don't believe we've got the complete story yet - that full understanding of exactly how the things that make that temperature respond. For some of the things we've tried do not appear, at least at first glance, to have a significant effect on it. So, we're still looking, as I mentioned - One other aspect is to try to turn that side of the spacecraft towards a little bit or a warmer body, that is, the Earth's reflection of the Sun. And there may be other techniques involved. I think we pretty well understand the mechanics involved with the way that the temperatures respond to the pitch maneuver since we have tried several different attitudes. But we don't have that kind of understanding with this suit umbilical loop. But, as I say right now, it is stabilized at a point where we can live with it, if we have to, at this temperature. But we would like to understand it better and we would like to raise the temperature if we can, and we'll still be working on doing that.

QUERY When do you plan to bring the temperatures inside the workshop down? Aren't they too high now?

WINDLER Well, we'll have to do that within the next 12 or 15 hours or something like that. But we can do that by raising the pitch angle.

QUERY Yes, that's a point I wanted to explore with you. If the food people say you have to lower the cabin temperature within a certain amount of time, and yet you have not, within that certain amount of time, been able to work out everything as far as this new procedure that you're thinking about, what do you do then? Do you go ahead and say, well, if the thing freezes, we'll let it freeze. Which has a higher priority, the coolant loop or the food?

WINDLER Well, I guess we'll take the next several hours to decide that. Let me point out to you, it is my understanding that the food is not an instantaneous thing. I mean, at 130 degrees, it doesn't magically turn into ashes or anything like that. And also, it is a thing that happens over a period of days and to varying degrees. And also, I understand that there is only about 10 percent of the food that is affected by this high temperature. I don't know, that's the number I understood from the program office. So, we're not talking about 100 percent of the food being affected by this higher temperature. Also we were at temperatures which, I mean, sorry - We were at angles, pitch angles, which were satisfactory from the food and the internal environment point of view. And this suit temperature, suit loop temperature, was satisfactory at that time. Now, as you are probably also aware, we did have a switchover from the primary coolant, airlock module coolant loop, to the secondary. For a short while, we were back on the primary, but that's 30 minutes or so or something like that. Since that time, we've remained on the secondary, which Craig has already said is a duplicate and it works fine. So that transition probably had some effect on the - on the response of this temperature, which we don't completely understand yet, either. All I'm trying to say is that we really - There's reason to believe that we can go back to this other attitude and perhaps not have the suit temperature drop below the freezing point.

QUERY Let's hear another case where the coolant loop does freeze and let's even say that the heat exchanger cracks. What does that do as far as the mission is concerned?

WINDLER That's all that happens, nothing.

SPEAKER Right?

STARESINICH That's right.

WINDLER We've got another loop that works, and we also have another suit capability.

QUERY ...

SPEAKER Oh, yes.

PAO Let's get one from Mary.

QUERY I may have missed this earlier but now that we're up in the high temperature range of 120, I believe it is inside, is it possible that we might have more outgassing of TDI. Is there still a residual in that foam?

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WINDLER I really don't have a very good answer for your question there. I think that the temperatures - We were at higher temperatures than this before, earlier in the mission. And it is my understanding that those were what caused the outgassing and the temperatures that we are at now, plus the pressures, restrict the outgassing. You know, we're in these cycles; cycle the pressure up to about 2 psi, drop it down, fill it up again, dump it, etcetera. There is about 4 of these cycles. We are near the end of the first one, or close to it, although we did stop it for a few minutes - a few hours - to allow the attitude to stabilize. And we think that this, even at the temperatures that we're at, this will clear up the outgasding.

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WINDLER And we think that this, even at the temperatures that we are at, this will clear up the outgassing situation.

QUERY Do we know if there is any residual though in the foam that could outgas if we go higher again? Is there any way to assess that?

WINDLER I don't know the answer, I'm sure somebody must, but I don't. I don't really know the answer to that. I've certainly been led to believe it is undesireable to get back up to those higher temperatures. And those are in excess to those I was talking about earlier.

QUERY And the pressure in the cabin right now is what?

WINDLER The pressure?

STARESINICH I'm sorry 0.98, somewhere around there.

QUERY It is probably a stupid question but why doesn't the backup umbilical freeze? Is that on the other side of the spacecraft?

WINDLER It's probably a very good question, and I don't know the answer and I've asked that question myself. And no, they are not. They are on the same place.

STARESINICH They're at the same radial location. They are located right underneath - right on the outside skin of the airlock module, in the same module.

WINDLER I guess, without getting into a complicated explanation which I couldn't do anyway, Craig could, but the way that the coolant flows through the loops is kind of complicated and has various paths that it can go through depending upon what is calling for fluid. We don't have you know a large measurement of every path that it can take. So there is some subjective evaluation there, but exactly where the flow is all going, so that makes it difficult to precisely say just exactly why one of them is responding differently than the other.

STARESINICH It's also functioned to where the transducers are. You know the temperature transducer on the loop may be closer to a hot piece of structure - closer to the internal wall or whatever. And without knowing exactly where they're located, it is hard to assess that.

SPEAKER Okay, thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 21, 1973
9:15 a.m. CDT

PARTICIPANTS:

Donald R. Puddy, Flight Director
John Aaron, Workshop Systems Engineer
Terry White, Public Affairs Officer

SL-1 PC-18A/1
Time: 9:15 a.m. CDT
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PAO Okay. Good morning. We'll - This morning we have Don Puddy, the off-coming flight director, and John Aaron (that's A-a-r-o-n), who is workshop systems engineer, call sign EAGLE. And, Don, you want to run over what the current status is after coming off from the past - You're on 8 hours now aren't you, instead of a 12?

PUDDY Well, that's a modified 8 hours.

PAO Modified 8 hours with 2 hours on either side it it maybe?

PUDDY And a little in the middle. Okay, basically, our activities this evening have centered around continued thermal management. We're still, of course, trying to maintain the habitation area temperature within as low a limit as we possibly can, primarily for, of course, the film and the food considerations. We have had a decrease in one of our coolant loops associated with the EVA suit loops. And basically what we're trying to do here is to keep it from getting too cold. Right now we're at a temperature of around 34 to 34.2 degrees, and we'd like to keep that temperature somewhere in the region of around 34.7 degrees. Basically, all of the thermal management is still going on by varying our attitude and by managing the various loads that we have the capability of switching via ground command. We're presently at a pitchup attitude of about 40 degrees. Hopefully, some time during the day we may bring that attitude back up in the order of 45 or 46 degrees, which is very close to the attitude that I've talked to you about previously. There are also a couple of other maneuvers that are being investigated, such that we might be able to get a little more heating on this particular area by using the effect of Earth albedo. And basically what this involves is actually yawing the spacecraft around 180 degrees, and then taking out the pitch we have in there now, plus putting it back in the opposite direction. Or, if you want to phrase that in different terms, actually after we complete a 180-degree yaw maneuver, we'd actually be pitching somewhere in the order of, say, 90 degrees - 90 to 94 degrees. I think we're - You can't say we're completely stabilized, but we are able to maintain, I think, a successful balance of the temperatures in each of these areas, and this is a continuing real-ime management problem. But we think we have it under control and there should be no problem. As far as the Skylab 2 lift-off is concerned, to the best of my knowledge, we are still looking at a Friday launch. I did bring with me today a sample of the material that we are using for the alternate meteoroid shield, and this will give you

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some idea of what it looks like. It is aluminized Mylar on one side and a nylon fabric on-
othere This wab cut to
the scale of one of the earlier concepts; I mainly brought it just to show you an ideawhat the material looks like. As it stands right now, our plan is to carry with us two alternate types of shields, the prime candidate being the one that is deployed from the plus-Z SAL. Its dimensions being in the order of 22 by 24 feet, capable of being extended to just above the spacecraft's surface on up to a distance, I believe, of around 20 feet. The alternate - Of course, this one does not involve an EVA, this is strictly going into the workshop area, installing some modified equipment from one of the experiments - corollary experiments that we had scheduled for the mission - T027, in the SAL, and extending the rods. And there's a lot of detailed mechanism that we can go into if you want to later, but basically it just involves extending these rods through the SAL, putting a small downward movement once you have it the area you would like to deploy it, and it releases some springs which allows the sail to unfold and it can be modulated from there. After it is deployed, it can be rotated or it can be moved in distance from the spacecraft surface. The alternate approach to that is the -

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PUDDY The alternate approach to that is the Marshall-developed sail which I think George Hardy briefed you all on the other day. To best my knowledge those are the only two that are being carried, primarily due to weight limitations. Any of you that would like to view a picture of what the rods look like and things of that nature, I do have a picture here. One thing that we did talk about the other day and there was a question on that I want to clarify. It looks like we're getting a little firmer on our rendezvous and docking timeline and we do expect to have real-time TV from Guam, and this is just prior to the flyaround maneuver, starts at about 7 hours and 32 minutes elapsed time and runs for about 10 minutes to about 7:40 elapsed. And hopefully again picking up the States around 8 hours and lasting there for about 10 or 11 minutes. This is our present plan and should have that real time assuming there is no perturbations to the rendezvous. Of course, the flight plan for that day is the standard M = 5 rendezvous which we had normally planned to have for Skylab 2. In addition to that we do have the one SEVA activity which is designed to see if we can free up one of the AM solar array wings. One or both as the case may be. And that's about all I have and opening up for questions.

PAO Please wait for the mike, Bruce Hicks.

QUERY What would be the time of the SEVA activity basically?

PUDDY Okay, the plan is that they will accomplish the flyaround. They will come back in after that for a soft docking. They will go through a - a supper period and will actually undock after preparing for the SEVA at around 10 hours and 35 minutes. They will use the entire next dayside pass for that particular SEVA activity. Hopefully docking just prior to sunset, and this docking should occur somewhere in the order of 11:30 elapsed time from lift-off.

QUERY And the fix methods being taken, you said earlier two alternate. I suppose what you meant was just two, and not two alternate to a prime. Just the two - -

PUDDY There are two methods to the best of my knowledge only being carried. The prime, which is the one from the plus-Z SAL, the alternate which is the one that's attached to the ATM structure. The A-frame.

PAO Barry (garble)

QUERY Have you determined what kind of problems you are going to have in the event the water in the coolant loop does freeze?

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PUDDY Well, there are possible problems associated with the - our main cooling loop. There is a common heat exchanger associated with the main cooling loop. We don't know whether or not this could be considered the weak point in the system or not, but our primary concern is just not to let it freeze and we think we can do this.

PAO Peter Mosley.

QUERY A follow on that question. I'm not quite clear what this AM coolant loop feeds; what it's there for. Could you tell me that? And is it different - I mean originally when was this glitch with a switch from - the switch to a backup cooling loop, remember this happened twice. Is this the same coolant loop, and is it serving the same purpose?

PUDDY Right. We have two primary equipment cooling loops in the workshop. And the problem that you referred to where we had the switchover; yes, we did have a switchover, in fact we've had it occur twice. Isn't that right, John? Basically the - and we did switch back by the way, and basically we feel right now based on the data that we have, that it is some sort of a logic problem associated with switc over circuitry itself and not actually a problem with the operation of the coolant loop. After we did have that first switchover we did go back to the primary loop and were able to stay on that loop for a period of time and shortly thereafter we - we did get a switchover again to the secondary loop. But we know there is nothing wrong as far as any leakage from the loop. We also know that the pump which circulates the fluid in the loop is operating properly so we feel we just have a logic problem. We are flying right now on the secondary coolant loop with the switchover capability enabled.

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PUDDY We are flying right now on the secondary coolant loop with the switchover capability enabled, which means that if we should have some sort of failure in the secondary loop we would go back to that primary loop. As far as the question that you asked on the commonality, there is a heat exchanger that is common in that loop that we have the cool temperature problem, that is common to this AM coolant loop. And the AM coolant loop that we're talking about is the primary loop in the workshop that has equipment such as the batteries, charger modules, major electronic equipments mounted on it, much as the Apollo coolant loops that I'm sure you're familar with. This is the main coolant loop for the spacecraft.

PAO Manuel Doza.

QUERY Do you have any rundown on the timeline until they actually get into the OWS and start working?

PUDDY I can give you that in only a very summary fashion. It has not been completely defined. Basically, after we have completed the rendezvous, docking, SEVA, we will be hard docking. The crew will go to sleep without removing the command module hatch, probe, drogue, or any of those operations. They will sleep in the command module that first night. The next day we will be performing some checks for the - any contamination in the workshop and we are able to do this after we've opened up the command module hatch, removed the probe and drogue, we're actually able to do this through the hatch itself. There is an adapter that has been made to fit on one of the valves on the hatch and we can check for any contaminants. Assuming no contaminants are found we just continue this operation right on through the spacecraft until - be advised that all the hatches in the spacecraft were launched closed. We'll continue this operation right on down until we get to the SAL. Now exactly - I believe it's the afternoon, don't quote me on that because I'm not positive. I believe it is the afternoon of that day when we do plan to go ahead and put the shield out through the plus-Z SAL. That timeline is still being worked, but that's the general trend of activity. Of course, in there, there is some small activation functions that must occur.

SPEAKER Inaudible.

PUDDY That is, starts out with the sampling first thing Saturday morning and ends up with the deployment Saturday afternoon, that's correct.

PAO Arthur Hill.

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Time: 9:15 AM CDT
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QUERY What's the current rundown on the tape recorder in the ATM and why it was getting hot? What the problems were there?

PUDDY Well, this is due primarily to the fact that we are in an attitude that is not optimum for locations where the tape recorders are in the ATM. There is no serious problem there. We are trying to maintain a continuous operation of those recorders below a temperature of 86 degrees. When I came off duty one of them was in the 60s and one of them was in the 70s. And basically, what we've done is we have just restricted our recorder operations to those periods where we are accomplishing maneuvers or where there is some idea that - of a specific area in ATM data that we would like to have during a rather extensive LOS period.

QUERY What are the tape recorders recording?

PUDDY Basically what the tape reocrders are recording is the same data that we get down on the ATM systems during real time. And the recorders are only there to give us that same data while we are not in station contact. We're running not only the recorders for the ATM but we're also running a couple of recorders for the airlock module data.

QUERY Let me rephrase the question. Basically, what you're recording is information on how the systems are operating but no experimental data or anything like that?

PUDDY Those recorders would be recording experiment data if we were conducting experiments. But, as you're well aware right now, other than the QCMs, the quartz crystal microbalance, contamination measuring instruments, and the MDA spectrometer which is a radiation measuring experiment, we are not conducting any other experiment operations. So, no, there is no experiment data on there right, Art.

PAO Okay. Let's take one more here with Bruce Hicks and then go to the Cape for a few.

QUERY Don, you said that 86 degrees, trying to keep it below that, is that 86 degrees the highest you want to go or is safe to go, and what - if not, what temperature will you have damage to the tapes.

PUDDY Let me say that 86 degrees is what we had presently defined as a redline limit for those particular recorders. It is certainly not, to my knowledge, a temperature at which we would expect any damage to occur to the tape or to the tape recorder itself. It's merely a limit under which we would like to keep the tape recorders such that we could have continued use of those once we have been able to get into a normal attitude and go into our extensive operations which make higher use of the recording capability.

PAO Let's take some from the Cape.

QUERY To borrow a cliche, I'd like to have you make one thing perfectly clear. First of all, as I understand it, deployment of the umbrella will be attempted

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through the scientific airlock. The second alternative would be to deploy the sail from the Gemini hatch of the Apollo - I mean of the ATM. Does that mean that they have completely excluded deployment of a sail from a standup EVA out of the CSM?

PUDDY To the best of my knowledge at this particular point in time, that is entirely correct.

QUERY Has the plan changed for the time of intercept, the time of closest approach, or has the information on tracking data revised the timing which would have had it outside of the period of the first TV possibility via Guam?

PUDDY No, I think basically that, if you will remember, the rendezvous plan, our attempt there is to try to provide the TV coverage of docking itself. And that was to occur over Guam. And basically what we have done is we have extended the period of time between our first docking such that we can conduct the flyaround operations and the first site that I quoted to you was Guam. We can also bring this TV in from the State coverage and that is during the daylight period and the continuation of the flyaround exercise. So, there has been no real change in that area.

END OF TAPE

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QUERY Can you just confirm something. It's an elapsed time of 7:32 until 7:42 (garble)

PUDDY I don't have the exact AOS and LOS times, but within the granularity of what I can read here, it is 7:32 to 7:42, that's correct. And 7 -

QUERY I just want to make sure whether I got the sequence right. So you would go up, fly along, look for the damage on the solar wing, dock, and then later on undock again and make an EVA to repair the solar wing, and then dock again, is that correct?

PUDDY That's correct. Basically what we would be doing the first time is what we call a soft docking, which means that we have only engaged the capture latches, and subsequent to an eat period and the preparation itself for the standup EVA, we would then subsequently go out and conduct that standup EVA operations for - and we're allowing a full dayside pass for that.

QUERY With this second deviced you deploy, is that what you referred to earlier as fragmented sail, just to make sure?

PUDDY I'm going to have to defer that one to somebody else, maybe. Do you have an answer on that one?

AARON No, I haven't.

PUDDY I have not heard it called the fragmented sail. Basically, this is the one that has been described to you as an A-frame type device that is mounted on the ATM structure; has a sail device that can be deployed much like you would pull a sail down a flag pole. It extends from the ATM area out over the workshop. Again, I think the dimensions on the sail are essentially the same. Most of the designs that were talked about were approximately 400 square feet. But I haven't heard that particular one called a fragmented sail.

QUERY Is it definite now that you only are taking up two devices, not three?

PUDDY To the best of my knowledge, that is true. We are only carrying two devices at this time.

QUERY Then it's not - When will you have the definite flight plan?

PUDDY Those flight plans are in the process of being generated now, and I would expect it - we would have the majority of the flight plans completed within the next 2 days. We're in the process of making the required changes to the crew checklist now, what we call the Flight Data File. We're reviewing these as time permits on each of our console shifts, and they're being released to the printers on an as-available-as-reviewed basis. And we expect - In fact, some of them are going to print this morning; the remainder will be going to print over the next couple of days, and I believe we're planning to have most everything stowed in the spacecraft by Thursday evening.

QUERY You mentioned use of an A-frame for deployment from the ATM. Is this the same device that we have had previously described for us as a T-frame or a T?

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PUDDY Yes, I believe it could be referred to as a T-frame, yes. Or a V-frame if you want to look at it that way.

PAO Okay, we're back in Houston now, no more questions from the Cape. Anyone have any questions here?

QUERY How many complete new flight plans, how many days are you renewing the flight plan for?

PUDDY Basically what we're working on extensively now is to get the Day 1 activities, which is the rendezvous, docking, SEVA 1; the Day 2, which is to accomplish the SAL deployment; and Day 3, which is the alternate flight plan should we go ahead and have to accomplish the EVA operation for the other meteoroid sail deployment, and then some work on just exactly - I think we're going - trying to go through around Day 5 of the abbreviated activation checklist are included in there -

END OF TAPE

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PUDDY The abbreviated activation checklists are included in there. Subsequent to completing the checklist that - basically get the workshop configured with some type of alternate meteoroid shield and the basic experiment activation completed. Of course, we will go into our normal cycle which is basically working up the flight plans on a real-time basis. Where doing one shift, we more or less forecast what we are going to do for the next day and also extrapolate that plan out for approximately a week. And then the next shift we - subsequent shift, we actually work up the detailed plans that we would up-link to the crew on the teleprinter as to the exact sequence of operations that we would like for them to follow. And of course, one shift devoted strictly to the execution of that flight plan.

PAO I understand that the early summary by Don Puddy didn't get on the tape for the purposes of the transcript. I wonder if you couldn't just quickly summarize in a couple of minutes your shift just completed.

PUDDY You really think I can go back through that in the same sequence, huh? Okay, well let me say that the major activity that we're going through right now is to try to optimize the spacecraft thermal environment. And basically the way that we're accomplishing this is through attitude maneuvers and actually managing the electrical loads that we have the capability of turning off and on by ground command. We basically have been able so far to maintain the habitation area near the temperature that we've been quoting to you. We do expect some small rise in that in the next few days because we're also have experienced a - a problem with one of the suit cooling loops becoming too cool. Actually the temperature right now is running around 34.0, and our desire is to keep that temperature in the area of 34.7 degrees. We have during the evening actually rolled the spacecraft over one entire dayside revolution in order to put as much sun impingement on that particular area as possible to see if we could effect a short-term recovery in that particular area. And subsequently we plan to maintain a decreased - slightly decreased pitch profile in order to maintain that temperature. Right now we are at a present pitch of 40 degrees and as we do get that temperature stabilized we will try to move the pitch back up close to 47 degrees in order to maintain an optimum balance between this particular temperature which is getting too cold and the OWS habitation area temperatures which of course, we want to maintain as low as possible from the standpoint of film and food consideration. And medical sample considerations.

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SPEAKER Okay.
PAO Thank you, Don - -
PUDDY How much of it - Did we get all the sail description on tape?
PAO I think so, yeah. He says we did. So thany you very much. That ought to wrap it up.
PUDDY I do have a picture here if any of you would like to take a look at that.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 20, 1973
5:00 p.m. CDT

PARTICIPANTS:

Neil B. Hutchinson, Flight Director
George Hardy, Director of Engineering Development and Integration, MSFC

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PAO Okay, we have a small crowd here in Houston. I don't know how many are at the Cape. I understand we have a few questions to come from the Cape a little later. We have here, this evening, Mr. George Hardy who's Director of Engineering Development Integration at Marshall Spaceflight Center, and the off-coming Flight Director, Neil Hutchinson. Do either of you have something you want to run over, say, the last 8 hours of operations. We'll go to questions from there.

HUTCHINSON We'll just give you a quick rundown on what's been going on; today, very little. As you know, last night, or yesterday afternoon late, we had a switchover in the coolant loop in the airlock module and on one of the shifts last night, in fact, the early evening shift last night, we switched back to the primary loop and, indeed, we got another unexplained switchover back to the secondary. The switchback to the primary loop that was done, none of this was done on my shift today, last night indicated that we, indeed, had a very good loop and that we probably have some logic problem in the switchover logic, which is the automatic failure detection circuitry that decides that a loop is bad and turns it off and calls the other one up. So, in a nutshell, our airlock module coolant problem is nothing, as far as we can tell, wrong with any of the equipment concerned with the coolant loops, either one of them. It has to do with the logic that switches it over from one loop to the other, and right now, the configuration is, we're on the secondary coolant loop with the number one pump on, or A pump, as some people call it, and we have switchback enable to the primary loop. We don't have any qualms about going back to the primary loop if we get a switchover. And if, and when we do, or would get a switchover back to the primary loop because of something wrong in the secondary loop, then we would probably have to take some action to try and either isolate how - come we don't have - we have this automatic switchover that keeps tripping us off the primary loop. But for now, we're in great shape, and we'll probably just leave it sit right where it is. The airlock ATM data recorders are off. We're cooling down the recorder module and the reason it's warm is because of this strange attitude we're flying around to preserve the thermal balance in the workshop as best we can. This won't be a problem when we finally get up there and get the curtain up and get back to a solar inertial. We'll have the recorders back on all the time. If we chose to use them now, we could turn them on. We're just being super conservative and there's no real reason to have them on. We aren't having any problems with any of the systems that they record data for, so we've got

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the recorder package for the ATM telemetry system turned off. We're continuing to balance loads and modulate heaters on and off in the front end. The front end of the vehicle's still fairly cool. The airlock module coolant loop's still running fairly cool. However, we've been turning a couple of defunct PCGs off one of the SAS wings on and off. We're getting a small amount of current, as you know, out of PCGs 5 and 7, I believe it is, and we are turning the battery chargers on and off on those two regularly to add a little heat to the airlock coolant loop. Another thermal thing which we have been baby sitting especially carefully over the last 24 hours are the water suit coolant loops, which are on the airlock module coolant loop to heat exchangers on the airlock module coolant loop, and these are the water loops that cool the crewman EVA. We have actually made a vehicle maneuver. We've rolled the vehicle. I like to think of it as north and south. In plain English, we've rolled the vehicle a little bit to the north to expose this area outside a little more to the Sun so we can warm up one of the suit coolant loops that's been getting fairly cool, and we've discovered we've been able to maintain a temperature around 35 degrees, which is above any -

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HUTCHINSON - the, one of the suit coolant loops that's been getting fairly cool, and we've discovered we've been able to maintain a temperature around 35 degrees, which is above any place where we'd be worried. The obvious thing we're worried about there is water - it's really a water loop, and water freezes at 32 degrees. And when it freezes it expands and it cracks things. And we seem to have that under control and seem to be able to maintain the temperatures right where we want them. We're continuing to monitor our attitude. Of course, we've not gone back to solar inertial, so we've not had the Sun sensors on the Sun. We're continuing to monitor our attitude using electrical current for pitch control, two temperature transducers for roll control, and momentum use for yaw control in and out of plane. So the thing that is really kind of amazing, the EGILs and the G&Ss, the guys who worry about the electrical currents and everything, are having the last laugh in the control center, because they finally got one up on the guys that are supposed to know all about inertial systems. I think that's about all. We cooked along real well today. We had no failures at all in anything today, and I think every day we do this. we seem to understand a little more about the thermal situation and about how to sneak around and keep it in tow, So we're controlling it instead of it controlling us. The planning has been proceeding for the - for the manned part of the mission. Being on the console today, I just get bits and pieces about what's going on. But I think we finally pretty much understand how we're going to do the activation, and I think that whole thing is moving along pretty well. I think in the next couple of days - in fact, I suspect probably by tomorrow afternoon, there will be a fairly coherent flight plan out that you can all look at and see where all the big events are going to happen. That's all I had, Terry.

HARDY I don't have anything to add to the activities of the last 12 hours. I think Neil has covered those very satisfactorily.

QUERY Could you discuss the change in sunshade deployment plans. I understand now you've decided to go ahead, and the prime sunshade would be through the SAL rather than one of the EVA plans.

HUTCHINSON Yes. I have been on the console, so I have not been directly involved in the planning. George may be able to add some to this. I can kind of give you a rough cut of what we're planning on doing now; and, as

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far as the rationale behind why we have gone prime inside, I have my own opinion. But I have not been involved in it and I'd soon not comment on that. The basic plan is, when we get into the workshop in the morning, we're going to turn on the airlock in the MDA - in other words, make it habitable and turn on the air scrubbing and turn on the air conditioning and the lights and so on and so forth. That pretty much takes the morning by the time you get through the hatch and get all the work done in there. That's about a 4, 4- 1/2 hour job. We're going to eat lunch. We're going to go into the workshop, and then we will - we'll probably make some decisions on whether we can work in there with the temperatures in shirt sleeves or whether we're going to use the LCG. As you know, we're flying up the gear to be able have a crewman in the workshop, liquid cooled with no suit on. And we have some very basic things we need to do when we first get in the workshop. At probably an hour after we first open the hatch, we'll go to work to deploy this device. And we'll have the entire afternoon of day 2 to do it. Now I don't know anything about the particulars of the deployment, and I'm not sure anybody does yet. I think they're just now starting to home in on the kind of a checklist we need to do it and so on and so forth. It is using some existing equipment. Besides the stuff you have to take up, it is using some existing experiment gear to get it out. George, do you want comment anymore on the shield itself?

HARDY Well, I think - the reason behind it - I think there have been some advantages known all along, and that mode is rather popular. It's - as you know, of course, doesn't require an EVA. The task is relatively straightforward. As Neil said, there is a lot of details that need to be worked out on it. We have several experiments that are deployed out of the scientific airlock. And we have one, in particular, that has a means of deployment which is quite similar to the one - -

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HARDY - hard to flow it out of the scientific airlock. And we have one in particular that has a means of deployment which is quite similar to the one that would be used for deploying the scientific airlock solar shade.

QUERY In other words, the crew knows ho to do it.

HARDY Right. And I think - -

QUERY Or has a semblance of knowing how to do it.

HARDY One of the key factors is that, in looking at the several modes, it's felt that this is one in which would require the least crew training and still have a high competence in deployment.

HUTCHINSON It's also completely leisurely. It also has the advantage of the crew having a good solid sleep before they have to tackle it. And like George said, the one big thing - I mean, doing an EVA is not a particularly difficult thing, but it's a long, arduous task that takes all day long by the time you get the preps, and get out there, and get back in, and get all the suits off. I just think that the whole SAL plan, if it works out right, it's easier - plain and simple.

QUERY That's like that means it's also safer. Anything that doesn't involve an EVA would be safer. Is that right?

HUTCHINSON Certainly. Not that there was any particular peril with the other technique, but, I mean, if you're in the cabin - -

PAO John Pollock.

QUERY I got a bunch of hem on relatively minor things, I guess. First of all, since we're talking about the SAL, I've heard, 3 or 4 days ago, that there might be some real high temperatures around that airlock. Do we have any numbers on that, and are we at all concerned about the possibility of the thing sticking because of expansion or anything like that, or about burned fingers?

HUTCHINSON Well, I'll address the burned fingers, George might want to address the temperatures. The burned fingers thing is certainly no problem because we have gloves. If there's any question whatsoever of the touch temperatures in the area, we'll be wearing either EV gloves or we've got some - well I know we have EV gloves. I don't know whether they've decided to put those other gloves on board the CSM or not.

HARDY Yeah - -

HUTCHINSON I don't know what the temperature's been running.

HARDY Well, I'll just comment. We do have a temperature sensor on the scientific airlock, have been looking at it. I haven't looked at it lately. I don't know what it is, but the people that are engaged in design of this concept are aware of the temperatures. They know what temperatures they

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will be having and, of course, they will take that into consideration. So, we don't expect, certainly, to get surprised by the temperature we're going to see when we deploy this shade.

QUERY Okay, ever since this boat hook or shepherd's crook was proposed to possibly try to get that solar array unstuck - something Isaac Newton said has been bothering me. How are you going to hold those two spacecrafts stable in relation to each other while you're trying to pry this thing out?

HARDY That - of course, the simulation in that regard is still being conducted. I think one of the things that's being considered that - the crew members - in that situation might use a push-pull type rod. He might have one rod which he puts against the solar beam, solar array beam, and then he pulls with the other one.

HUTCHINSON There obviously has to be some - I mean, you can't just go up there and give it a shove or you'll shove yourself away, or give it a tug, you'll tug yourself into it. There has to be some arrangement like that. I'm not sure that people really understand how much - and I suspect we won't understand, until we get up there, exactly what we have to do to free it. For all I know, you just might have to get some garbage off the front of it and the thing will go.

HARDY Now, one of the things of course that we feel real confident of is that the wing nearest the end of the beam has been released and is showing some 5 to 6 or 7 degrees deployment. Now, there is a ... actuator that pushes the deployment of that wing and there's springs in that system. So, there are some forces we know that will exist, and, as Neil says, that it just may be, that when they release the debris that's holding it, that the wing will deploy itself.

QUERY What's the gas pressure status inside the workshop now? You took it down to 0.7 psi last night, that's the last I heard is that - -

HUTCHINSON Right, we took it down to 0.6. I think it's probably back to about 0.7. We are just a tad warmer inside, not much, just a tad. We think that's probably why it came back to 0.7. We're not adding any gas - -

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HUTCHINSON We are just a tad warmer inside. not much just a tad, and we think that's probably why it came back to 0.7. We're not adding any gas. We intend to leave it there - I knew I should have brought this profile with me. We have a plan for purging the vehicle prior to the crew getting there, which we won't launch into here for quite some time. We're going to leave it outgasing right where it is. It's not venting. We're not doing anything with it; we're just leaving it at 0.6. Now we're going to go through a series. I believe the entire plan takes like 100 hours all told, something like that. And there are like four partial pressure cycles at which we will pressurize from the 0.6 up up to about 2 psi, if I remember the numbers, then back down to 0.6 up to 2, back to 0.6, the idea being we're purging the gas inside. The last time down, we're going to go down to 0.1 and then we're going to take her up to orbital pressure. And I understand that there is some discussion as to whether we're going to do this with 02 or N2.

HARDY Yes, that's right. And the idea is we just want to use the gas that we have the most of. We don't think we have a big problem either way. I think the latest discussion is we'll probably use nitrogen.

SPEAKER Yes, one of the votes for nitrogen is that it is truly an inert gas and, of course, one of the gases we're trying to dispel is CO2 and, if you add 02, you're providing one of the ingredients for forming CO. I suspect we'll go with nitrogen. But, like I said, this isn't going to start until like Wednesday or so, a couple of days hence.

PAO One more question here. Hal Roster, and then we'll go to the Cape for a while.

QUERY A couple more on the sunshade thing. Is the current plan to take two SAL deployable shades? And also one or two of the EVA as backups? Or just how does that stand? And also, why is the airlock module full EVA sail the prime backup, if I can say that, instead of the SEVA sail, which was the prime?

SPEAKER Well, the crew plan is to take - is still, as it's been for quite some time - to take at least two solar shades. We've mentioned that it appears now that the scientific airlock umbrella or parasol appears to be the prime mode. The two EVA one standup EVA, the other EVA from the airlock - shields will be evaluated by the prime crew in Huntsville on Tuesday. I think that announcement was made to you last night. And it will be that evaluation by the crew that will have a great deal in making the final selection of the backup mode.

QUERY Did you say the umbrella is the prime of the SAL rather than - the last status report we had, had them both even, the inflatable and the umbrella?

HARDY I think the umbrella - of course, this thing is developing as it goes and evaluation is going forward, and I would say that the umbrella approach evaluation, to date, strongly favors that as the prime. I may mention one thing. The many modes are still continuing through development, through evaluation, and, in most cases, even flight hardware schedules - schedules to get flight hardware built and delivered on each one of these is still going. They tend to be prime or coming to a position of prime as the evaluation tends to favor one toward the other. But that's the way it is right now.

PAO Okay, let's take one more back here, and then go to the Cape.

QUERY Is this umbrella shade of the same material as the sail that they're making here?

HARDY The umbrella shade is being made here at JSC, and it is material that you are familiar with. Material evaluation is also still in process. But that tends to favor that material right now. It is rectangular. All shades orsails or shields that are being considered are generally 22 by 24 feet.

PAO Okay, switch to the Cape.

QUERY Would it be possible to take up two EVA sunshields and the umbrella device in addition to it, that means three all together? Or do you have to make a decision on that before the launch?

HARDY It appears from - The primary constraint here is the command module stowage and command module weights. And that evaluation is still being made. However, as of last night, it appeared definitely that we had found accommodations, space- and volumewise, for two modes and some possibility that there might be accomodations for three. But that has not been verified.

QUERY If they deploy the umbrella and they take this device and this would be the prime mode, would the astronauts then unfold or try to unfold the solar wing before they deploy the umbrella. I mean, up to now, we've thought that at first they're going to make the EVA and try to deploy the solar wing. What about the solar wing now, if they make the umbrella method first?

HUTCHINSON Current plans have not changed in that regard. The SEVA or standup EVA is still going to be conducted on the same day as rendezvous. And the wing -

attempted wing deployment and cleaning off whatever debris and the inspection will all be done prior to - on the first day, prior to going into the workshop, which will be done on the second day. So, therefore, the wing deployment is done - or the attempted wing deployment will be made on the first day, the rendezvous day. And the thermal shield will be put out on day 2, through the airlock.

QUERY Up until now, I learned that everything had to be at the Cape Tuesday, that means all the hardware. Now, in this last status report of 2:00 p.m., you say it has to be on Wednesday.

HARDY Well,I wouldn't want to comment too authorotatively on the requirements date for hardware at the Cape, but I do know that it will certainly be on Tuesday.

QUERY It's an iffy question, I realize, but is it possible that, as a result of what the crew find - the prime crew finds in the neutral buoyancy simulator at Huntsville, that this might change again and there might again be a switch between the prime and the backup system?

HARDY Such a thing is indeed possible.

QUERY Following that up a bit, can one assume that one reason for this change is that tests or rehearsals in the tank have suggested that it is going to be very difficult to deploy these curtains on EVA?

HARDY Contrary to that, I think that the one-g test in the laboratories have indicated that the umbrella itself is going to be easier than initially anticipated. There's been a great deal of popularity for deployment through the scientific airlock. It's just that we did not really start the concepts, or we didn't get out the conceptual phase on those modes quite as early as we did on the sails. So, as that concept caught up, it became more and more popular.

QUERY Won't using the scientific airlock cause an additional day delay in getting into the workshop?

HUTCHINSON Yes and no. Basically, I don't know how much you folks knew about the plan of attack we had if we ended up doing an EVA out of the airlock. But it won't cost any more; in fact, it won't cost as much as that would have cost us. Because our plan there was to go in and turn on the airlock MDA so it was liveable then go down into the workshop and retrieve the gear that we had to have to do the EVA because,as you know, there is an umbilical down there and there's a suit unit and there's a helmet visor that we've got to get out of the workshop

before we can do an EVA. And that would have taken a half a day, and then we would have done the EVA on mission day 3. Now as it is, with this deployment, what you say is true. Based on a nominal activation sequence, we will not sleep in the workshop on day 2. We'll sleep in the CSM because we'll spend our entire afternoon, instead of turning on the workshop, deploying the shield out the SAL - -

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HUTCHINSON - on day 2, we'll sleep in the CSM because we'll spend our entire afternoon, instead of turning on the workshop, deploying the shield out the SAL. And then we'll come back up, sleep, and then get up the next morning and turn the workshop on, and we'll be fully up and sleeping in the workshop at the end of day 3, which is one day late. However, if we had done the EVA, we probably would have been day 4 before we would have been in there sleeping.

QUERY However, if you had done the SEVA technique, an SEVA technique, it could have been on day ? you could have gotten in the workshop. Is that not true?

HUTCHINSON Possibly.

QUERY And one further question. Is it possible, and once again this is iffy, but will it be up to the Commander, if he gets up and does this SEVA and looks out, will he have the equipment on board if he decides that the SEVA technique for the shield is a good one, will he have the equipment on board to do it?

HUTCHINSON Well, I think George already answered that. It's not clear yet, and I can't address the stowage question at all, but it's not totally clear yet if we have the ability to carry three separate methods. And we've already said that the airlock one, right now, is the frontrunner, and the EVA from the airlock - the scientific airlock is a front runner - and the EVA from the airlock by the man is sort of the next strongest with the SEVA third. So I think it'll really depend on the evaluation we have in Huntsville, and it'll depend on how the stowage finally works out as to whether we have the perogative to do that or not.

QUERY I'm sorry to ask you this, but it's just not clear in my mind. The primary mode is pushing the umbrella out in a shirtsleeve environment through the scientific airlock, is that true?

HUTCHINSON It's the front runner today at 5:25 Houston time.

QUERY That is at this point in the game. Number 2 is an EVA, is that right?

HARDY Well, number 2 will be selected after evaluation by the prime crew in Huntsville - both the SEVA and the EVA from the airlock scheme.

QUERY A query from (garble). How many at Marshall are working on the Skylab 1 problem?

HUTCHINSON Would you repeat the question please?

SPEAKER He wanted to know how many people are working on it.

QUERY How many at Marshall are working on the Skylab 1 problem?

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HUTCHINSON I'd say just about everybody there.

QUERY One more for Ed Tip. We've heard that 90 pounds is the limit that can be carried on the CSM. Is it still the limit?

SPEAKER That doesn't sound right to me, I don't - -

HUTCHINSON Initially - I think you are referring to an allocation that was initially made in the early days of these solar shield concepts. That has been revised. I can't quote you the number, but the CSM can accommodate a higher stowage than that, in fact, significantly higher stowage than that for tools and the sunshield.

SPEAKER That was a very preliminary number.

PAO Okay, that ends it at the Cape. John Pollock.

QUERY Getting back, you're going to do a SEVA right after rendezvous?

HUTCHINSON Yes.

QUERY And you're going to, at that time, clean away any debris and take a look at the - well, essentially, the whole plus-Z side of the - -

HUTCHINSON Take a look at the whole vehicle, plus we're going to clear away the debris, plus we're going to try and get the wing out. All that, based on the onseeing evaluation by Pete as to what he can do and can't do.

PAO Okay, let's take one last one here from Al Rositer and close it off.

QUERY A day or two ago, there was some concern expressed by someone, I forget who, that the SAL MIGHT BE BLOCKED BY DEBRIS SHIELD THE METEOROID SHIELD OR SOME THING ON THE OUTSIDE, AND THAT WAS THE REASON MORE EMPHASIS, THEN, WAS PLACED ON THE EVA. Is there any reason now why that has changed, and does this mean you will have at least one EVA-type shield just in case that is blocked?

HARDY Yes, that's - there is nothing particularly that is changed. I think that was purely speculation. We were not looking at instrumentation or anything to give us any idea that the SAL was blocked, but it was speculation. However, in the event that it might be and could not be cleared, then it's certainly prudent to have a backup which would not require the SAL. So, I think there is a very strong indication here that we will have, as a backup, an EVA mode for deployment.

PAO Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

CHANGE OF SHIFT BRIEFING
Johnson Space Center
May 19, 1973
9:45 a.m. CDT

PARTICIPANTS:
Charles R. Lewis, Flight Director
George B. Hardie, Chief, Systems Engineering,
  Skylab Program Office, MSFC
Dr. W. Royce Hawkins, Deputy Director of Medical Operations,
  JSC
John E. Riley, Public Affairs Officer

SL-1 PC16A-1
Time: 09:50 a.m. CDT
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PAO We'll go ahead and get started. We still expect a doctor to be here for the briefing. He hasn't arrived yet. He's in a meeting over in the control center so we'll go ahead and get started anyway. This morning we have - here comes Dr. Hawkins. Okay. We have starting on my right, Mr. George Hardy, who is Chief f Systems Engineering for the Skylab program office at the Marshall Space Flight Center. Flight Director, Chuck Lewis who has just gotten off the shift in the control center that's been managing the vehicle during the night. And, Dr. Royce Hawkins from the Johnson Space Center, the Life Sciences Director. Chuck, you want to give us a systems status please to start off.

LEWIS Okay, I think Don Puddy mentioned to you last evening that we would initiate the depressurization of the vehicle. We did that last night. We started from 4 psi. We got down to about a little over 2 - 2.1 psi and found out that we were getting some propulsion or torquing from the venting enough to saturate our control movement gyro so we had to inhibit or terminate the vent and we're looking at that. We're looking at a way to maneuver the vehicle, offset the vehicle such that the gravity - gradient torque will counteract the venting torque. And then it can pick up the venting again and continue on down to about 1/2 pound. And then, I don't know whether Don Puddy mentioned to you or not, prior to crew ingress there will be several what you might call pumping and purging operations where we have to purge the cabin gas and refresh it. Other than that there wasn't anything significant that went on last night. Other systems looked nominal to us.

PAO Dr. Hawkins do you have any kind of summary you want to give us on the possibility of toxic gases or what we're looking at in that area.

HAWKINS Well, what you just heard - this cycling and washout of the vehicle is the, of course, result of a problem that is generated by the heat that we're seeing in, heating up the walls of the vehicle and generating some - possibly generating some toxic substances within the workshop. This is a polyurethane liner inside of the vehicle wall. It's adherent to the outer wall and then it has an epoxy surface within the aluminum covering inside. Now we've - we're running tests in the laboratory but at Marshall and here, with similar materials, at various temperatures in order to try to determine what outgassing products we may have. And the likely substances are what is commonly known as TDI which is toluenediisocyanate. And then HCN which is cyanide and then some aldehydes and then CO, carbon monoxide. Now the toluenediisocyanate is really the principal substance of which we're worried about at this point. And this is used, we know, in the chemical process - formation - making of urethane. It's used in the chemical reaction. It gives you the foaming and hardening of the urethane. So it is there. And at the temperatures which possibly the - it may be seen. There may be some outgassing or there may be pyrolysis effect that the laminar surface with the outer wall and, therefore, a byproduct of that. So we're looking at what type of concentrations we would possibly be seeing. And it could range anywhere from 2 to 20 parts per million. Two hundred and twenty being the worst case by far, the worse, worse, worse case by far and I doubt that it's really up to that level. But the washouts, which you described, here are designed to reduce that to the lowest possible level in what we would certainly consider to be a safe level of .01 part per million at the time at which the crew would be ready to enter the orbital or the MDA and then the orbital vehicle. Now the plan is we will fly some Gregor(?) tubes which are sensors that we can sample the air immediately upon entry and determine what levels of TDI and also carbon monoxide that we would have left. If this is safe, well then they'd proceed on into the OWS, again sample, and again we would expect that that would be a safe level. Now, they would be entering in the - make this initial entry with masks which are trying to get aboard. And we've been running some tests again all night to determine just what would be the most effective type of mask to provide. And we've come up with a very - well, it's not one that we've developed really. It's a commercial product that it's just been recently introduced on the market, as a matter of fact, by mine safety applicance. That what they call an in-type canister contains hoptolyte and charcoal. The hoptolyte takes care of the TDI and the - I mean the charcoal takes care of the TDI, eliminates that and filters that out. And the hoptolyte takes care of the CO. So with this mode of entry and the sensors that we hope to fly up in the command module and the washout procedures that we've taken I think we will have a safe bird.

PAO Doctor, I won't suggest that any of our newsmen present would have difficulties, but for the benefit of our transcript typists could you spell the proper name of TDI, please.

HAWKINS Let me see if I can spell it (laughter). Even that's got a question mark by it. I've got it written down on a piece of paper. It's got a question mark by it. Let me see it's toluenediisocyanate. It's the only word I know of that has a double i in it. Pardon. Hoptolyte - hoptolyte.

PAO Mr. Hardy do you have some sort of summary you'd like to give us.

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HARDY I don't really have anything to add with respect to the status of the vehicle now, I think Chuck has covered that quite well. I think most of you have been in the briefings for the last several days know where the activity going on to build hardware and test hardware that will be used to shade the solar side of the vehicle, that work is still active and progressing according to schedule. Several options are still being evaluated and -

END OF TAPE

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SPEAKER ...that work is still active and progressing according to schedule. Several options are still being evaluated and in the next few days we will expect that to proceed to a point of - of the crew being proficient in their training on those options. And we would also still expect at this time that more than one option will be flown into orbit with the opportunity to use which ever appear to be the best under conditions that are observed by the commander at the time.

SPEAKER We will take your questions now. Peter Mosley.

QUERY Dr. Hawkins, could you describe the - the affects of a worse case concentration of these gases on somebody without masks, for instance(?) What would they do you and I if we were in that situation.

SPEAKER Well it depends again on the concentrations, but of course, I think most everyone is pretty - pretty knowledgeable about what carbon monoxide does. The - this is an asphyxiant which ties up the hemoglobin of the oxygen transport system of the blood and therefore the body just does not get enough oxygen . The TDI is - is an irritant in really very low concentrations of which affects the eyes, which get the burning, but primarily the - it's an respiratory irritant where it's breathed in to the lungs causing edema and you get those - can get bronchial spasms and even pull an pulmonary edema.

QUERY Now, you mentioned cyanide.

SPEAKER Well, that's of course - that's a poison in itself. Again it effects the hemopoetic(?) system and causes death.

SPEAKER Ed Delong.

QUERY To follow up on that one, and then I've got another. Aside from TDI and carbon monoxide, how really seriously concerned are you about the other contaminents you named.

SPEAKER I really - I'm beginning to think really now that it's really just the TDI that we'll be having because it's used in the process of the making the urethane and it's probably - and there's usually about , as I have learned, usually about a 5 percent excess that's there in the - as the result of just the chemical. The amount needed in the chemical reaction - there's a residual about 5 percent left there, and I think that's what we really possibly could be getting out of it and what we're seeing. Now our lab tests over here in our labs have not shown any HCN. And this is leading me to believe that really that is the excess amount

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that was there that's really what would possibly be coming out, and therefore should be a limited process and that we're probably not seeing any pyrolysis effect that deterioration of the walls.

SPEAKER Ed has another.

QUERY Chuck, I wonder if you could tell us what time you started the venting from 4 psi; what time it was terminated; how much of a yaw were you getting; and what was the effect of it. Were you just using up more gas than you wanted to to counteract it or were you actually getting some yaw in the vehicle change attitude?

SPEAKER Okay, we initiated the venting at 03:31 GMT. And we terminated at 07:19, at 2.1 psi. And the reason we terminated is that we saw the - the yaw which affected our Z-momentum, begin to saturate and we terminated the vent 3 minimum impulse flying from the tacts. That's about 15 to 16 pounds seconds. A very minimum amount. But because we did saturate, we had to do what we call a CMG reset routine which sort of cages the CMGs again, that cost us somewhere in the neighborhood of 250 pound seconds, per pound seconds of tact, pound seconds of tact. Of course, I don't think that we saw anything that really in the change of attitude in the vehicle.

QUERY (garble)

SPEAKER Now we suspect that there will be a small maneuver. I don't know that value yet, they're looking at that now to maneuver the vehicle and try to offset this torque when we go back to the vent. We don't anticipate any big problem.

SPEAKER (garble)

QUERY Dr. Hawkins, those air sensors that they are going to use to determine the presence of gases in the atmosphere, are they standard equipment than the OWS or they taking it with them?

SPEAKER Standard equipment within the orbital vehicle? No, it's not really. The - these - we're flying up in the command module - these particular tubes that would give us those indications.

SPEAKER We have some questions from the Kennedy Space Center. Let's take those now please.

SPEAKER Having problems (garble). Okay, that's good. Go ahead and take somemore here. Anybody has anymore here? John.

QUERY I have a question on the time line. About when will the first opportunity be for the crew to actually enter the cabin?

SPEAKER That'll be the second day after wake up.

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SPEAKER Okay.

QUERY When do they actually go into the OWS to live?

SPEAKER That all depends on whether or not our thermal shade fix works and the internal temperatures fall within living conditions.

SPEAKER I'd just like to add to what Chuck have said there. I think we and everybody feels like it will work if we get it satisfactorily deployed, but the thermal profile (garble) are being run to give us a prediction on how long we think that would be. And until we have that and even the actual experience in flight the crew would not go in for continued habitation but it might indeed be possible if necessary they can go on for a short stay even before the temperature starts to coming down appreciably.

SPEAKER I might add that one question was when do we enter the airlock module. That would be on the morning of the second day. And assuming that the atmosphere has been scrubbed properly there no problem there, we'd probably plan now to enter the OWS to pick up some - some transfer items in the OWS in the afternoon period. And of course they would do their sampling at that time.

QUERY Is there a capable time concealed?

SPEAKER Since the urethane is outgassing now can we presume that that this material will have a lower point - lower bleeding point from now on. In other words, if the temperature rises again while the crew is later on in the mission will it start doing the same thing all over again? Is it - will it more easily outgasses that has already begun this breakdown period?

SPEAKER Well, it - excuse me, it really is - -

END OF TAPE

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SPEAKER It really is a function of temperature; and with the high temperatures, that's what happens. You do get the outgassing. Yes, that's what I'm going to try to answer. It depends upon whether you're really getting the generation of the material, or whether you're just getting rid of the excess of TDI that's there, as I mentioned a moment ago, which the latter is what I think. So as we can wash this out, burn it out, and really, this would be what's really happening now is really the best thing, I guess you could do is to bake it out and get rid of it. And you should no longer have any problem with it.

PAO Okay, Peter Mosley. Let me go through this first. We've had a question called in apparently from a black box listener, who's a little confused on how far we're going to depressurize. I think you said down to a half pound, did you not?

SPEAKER We're going to depressurize down to about 0.5 PSI.

QUERY Dr. Hawkins, just wanted to finally, could I hold on this TDI. At two parts per million, would that be lethal?

HAWKINS Yes, that's a pretty heavy concentration, really, and you would definitely expect to have a lot of pulmonary damage there, so that you want to definitely get it down to something like 0.02.

PAO His question presumed lethality, and you answered initially with, yes, and then you went on into describing only pulmonary damage. Did you mean to say that yes, at two parts per million, it would be lethal.

HAWKINS Well. Okay. Yes, it could be lethal, because of the damage, the pulmonary damage that would result. Yes. As I say, you die from the results of the damage, rather than as of a poison.

QUERY Doctor will any of the gases that you have up there right now, have an adverse effect, as far as you know, on, for example, any of the electronics, any of the transistors, any of the experiments? Will it act as an airborne acid, for example on it, to give you some wrong readings?

HAWKINS Not that I'm aware of. I guess you need to go back in step 2, really, you know we really don't - really yet know whether we even have any such gas up there, but we are certainly suspecting that we would, with the temperatures that the walls are probably seeing.

QUERY My question, you're not certain you have the gas? And you don't know if you do how much, to what degree?

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HAWKINS That's right. We're playing it very safe. We're taking all precautions so that we can cope with the problem, whatever the degree of risk it is.

PAO We'll try the Kennedy Space Center again.

QUERY I wonder if Mr. Hardy could tell us, please, exactly when the prime crew will arrive at Marshall, and actually work in the tank, and will it finally be their choice which of the four options on the shades are taken? Which two, presumably?

HARDY I can't tell you the exact time that the prime crew will be there. I know that some of the backup crew members; well, Joe Kerwin has already been there, one member of the prime crew. Rusty Schweickart has been there. I do know that they do plan, I believe it's Monday and Tuesday to be there, and I'm rather confident that the prime crew will be in that contingent. With respect to the selection of the schemes to be deployed, I think we mentioned earlier that to some degree, at least, the selection of the scheme to be deployed will be made after the spacecraft has been inspected in orbit, and centainly the commander of that crew will have a very significant decision. Part of that of that decision.

QUERY My question earlier was directed to the fact that you apparently have four options, of which before next Friday, two must be decided on, and two taken. Will it be the crew who decides which of the two to take?

HARDY The crew training, and the crew ability, the experience that they have in the training that they will do between now and the latter part of the week will certainly have a significant influence on the selection of the options that will be taken up, and I think that we have said that at least two options. We would expect at least two options to be flown up.

QUERY And the (garbled), is he concerned about the effect on the environment outside Skylab, as a result of all this depressurization and so on?

LEWIS No. You mean contimination? That type thing?

QUERY That's right.

LEWIS No, we're not concerned about that. As you probably know, all the instruments that we plan to use later for the experiments, they have doors, they're closed, and we don't expect any kind of contaminants from the O2 into dry gas (garbled).

QUERY Dr. Hawkins, two questions. Can these gas masks you talk about, are they already aboard, are they

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standard equipment, or are they being added?

HAWKINS No, they're not standard equipment at all, and they have not, as such been approved by management, to take them aboard. We're just at that point, and we'll present that today to them.

QUERY Then the second part. Do you consider this a new threat to the mission?

HAWKINS I'm sorry, I didn't quite get the ...

PAO "Do you consider it a new threat to the mission?"

HAWKINS Oh, well, I guess you're talking about the outgassing. I guess you would say, if you couldn't, certainly if you couldn't control the temperatures, yes, this possibly could be a threat. However, with the fix that is advocated, we feel highly confident that this can be made to work, and we should be able to control the situation very nicely I think.

PAO Okay, no more questions. Let me give you a rundown on what the crew is doing today, that we've just gotten. The three prime crewmen are now in the multiple docking adaptor trainer at the Johnson Space Center, engaged in pre and post EVA procedures involved with the concept that would use the airlock EVA. Later today the prime crew will be in the command module simulator doing these same pre and post EVA procedures for the standup EVA. Backup crewmen Rusty Schweickart and Story Musgrave worked late yesterday in the water immersion facility at the Marshall Space Flight Center on the deployment of the shade from the airlock module. Bruce McCandless is at the Johnson Space Center working on the development of tools to be used in deploying all of the various shade concepts.

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SPEAKER -- And are working on the development of tools to be used in deploying all of the various shade concepts. Later today the backup crew will be in the simulators at the Johnson Space Center going through the same exercises the prime crew is doing this morning. Tomorrow, the crews will have a half day off and will fly to the Marshall Space Flight Center in the afternoon, probably some where around 5 o'clock. Any more questions? Don?

SPEAKER Okay, I guess to clarify what you said they'll have a half day off and then fly to MSFC around 5. Is that arrival time - departure time, what?

SPEAKER That is an estimated departure time right now but, don't pin us to any departure time at the moment. It will be sometime in the afternoon, probably around that hour sometime but, it could change. We'll have more information on that tomorrow.

QUERY And now for the real question. Sort of a double thing. First, Dr. Hawkins, I understood that the original plans were that the crew would either have or wear some sort of face mask when they initially entered the lab, what you're proposing then is a swap or an addition of a new mask or what with this mask you can up with in your own eye testing and secondly, sort of aimed at all three of you gentlemen. Dr. Hawkins said that if the temperatures don't come down you've still got a threat to the mission. Chuck, you and Mr. Hardy said, if you don't get a proper deployment you may have temperatures that make the workshop unhabitable except for brief entries. I wonder how we reach that mix in there in the middle?

HAWKINS Maybe I confused you on this thing then. Let me try to clarify what I was talking about then. The question, as I interpreted the meaning of was, if the temperatures did not come down could you have a continuation of this outgassing, and I said yes. And if you did have them this could possibly be a threat. So here again it depends on whether you're getting that outgassing or not, one. Two, what the level of the temperatures are really that you're talking about, in the particular areas, and here again I don't think we're absolutely certain of exactly what all - what temperatures really are present in all areas there either. So I - that was what I was addressing. Now I'll let Chuck clarify the other point.

LEWIS Okay. If the temperatures - if this doesn't - isn't successful and the temperatures remain up where they are now and assuming that we don't have the gasses we're talking about at the present which we'll test for then we'll certainly - can enter the OWS periodically, transfer items needed and we'd run the alternate mission out of the MDA airlock module, transfer food and things like that. If the gasses are present, I don't know much about these masks that Dr. Hawkins has been talking about, but I suppose they could wear a mask into the OWS for that same transfer of items. So I would think that at a minimum we would get a mission out of the MDA airlock module. I don't know George might have -

HARDY I agree with that. It's obvious we have to satisfy the safety question. I'm sorry, what was it again?

QUERY Are you replacing a mask, are you adding a mask? Wasn't there originally a mask aboard and why isn't it adequate?

SPEAKER Okay. We do have masks aboard. They are oxygen masks, just straight oxygen masks, which, you know, for under normal conditions you would just wear that for normal entry where you didn't feel that maybe you had yet had adequate mixing of your nitrogen oxygen within the orbital vehicle, or something like that. But we do have that type of mask aboard. But we do not have anything of the type that I'm talking about now adding.

QUERY Why would an oxygen mask be inadequate?

HAWKINS Well, a self contained system could be, yes. As long as you're isolated you could resort to that. You just exclude yourself, you know, from the gasses. You might get some burning of the eyes if they were exposed, that would be the thing.

PAO Question here in the back.

QUERY If I understand correctly, you are going to try and deploy one of the solar arrays that you think is still there and possible to deploy, I gather with this Shepherd's crook, is that correct and if so when in the flight plan?

HAWKINS With the what?

QUERY Shepherd's crook? Am I correct in that?

HAWKINS I hadn't heard the term but, yes, you are correct. It, again, is something we're planning for and I think that they're working at Marshall on various tools, devices to try to deploy the wing. Again that will be crew judgment when they are there I think we'll provide the tools we think necessary to do that and when they're there can survey the situation and it'll be there judgment as to why don't they try it. And, of course, that would be done as part of the standup EVA on the first day, at the end of the first day. I don't know George may have some more information of the type tools they would use.

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HARDY That's what I had heard. It's some kind of a pole hook arrangement where they could latch on to the end of the beam fairing and try to pull it.

QUERY Would they do it before the deployment of the shade, or after?

SPEAKER Well, I think that's going to depend on what they see when they get there. And if in the process of the standup EVA in the fly-around they might observe what appeared to be an obstruction toward the end of this - of the beam that was preventing this from being deployed and then the decision of the commander was that he was at the place he wanted to be and now was the time to do it, then he'd probably proceed. If the task seemed to be more complicated, might require more time, then the decision might be made in real time to proceed and get the solar shade out and come back and worry about the beam at a later time.

PAO One more question.

QUERY Okay. I want to make sure I understand you perfectly. You have no means at this time with telemetry or any other way of telling whether or not you've got any kind of outgassing in the ship and, number two, TDI or any of the other gases that could be there - would they be clear or would they be cloudy? Would you be able to see them? Could they see them, for example, by peering through the scientific airlock?

HAWKINS No. There would not be any visual evidence of it and we do not have any telemetry or sensors onboard for that type gas analysis.

PAO Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

CHANGE OF SHIFT BRIEFING
Johnson Space Center
May 18, 1973
5:20 p.m. CDT

PARTICIPANTS:

Don Puddy, Flight Director
George B. Hardie, Chief, Systems Engineering,
Skylab Program Office, MSFC

SL-1 PC-15A/1
Time: 1720 CDT
5/18/73

PAO All right, we'll get star..d here with a change of shift briefing. We have Don Puddy, Flight Director, on my right. On his right, George B. Hardie, Chief of the System Engineering Skylab Program Office at the Marshall Space Flight Center. We'll just start off with Don.

PUDDY Okay, well let me start off by saying that the vehicle is performing very, very well. We have had no new vehicle problems. As far as the habitation area is concerned, we feel we're stabilized somewhere in the 100 to 110 degree region. The MDA wall temperatures are running somewhere in the order of 43 to 45 degrees. The airlock module is stabilized somewhere around 40 degrees Fahrenheit. We did have some concern in the airlock module about getting too cold, so we have brought on some additional heat loads in the airlock module. Primarily our concern there was, that we might freeze the water in the coolant loops that are located in that area. But, we did bring on some additional loads and have been managing those loads, and feel like right now, that we have that area very well stabilized, and expect no problems in this particular area. As far as our TACS status, which I'm sure you all are interested in. Right now, we're at 77.1 percent, which is about 13 percent below what we had planned to be at this particular time. But we're still some 43 percent above what we call our experiment redline. We're using TACS gasage at the rate of somewhere around 1 percent per day. We did go through some exercises today, by making several maneuvers about the Z-axis, where we feel like we're getting a much better hack on the momentum buildup. And by making these maneuvers we are able to go ahead and command what we call a reset routine, much less regularly. And as a result of that, we feel like, where we had been doing this command, which uses about 800 pound-seconds, or somewhere around that percent of TACS gas - two of these a day, we think we may be able get down to maybe 2 every, or excuse me, get down to 1 about every three quarters of a day. So, right now we're using it at about 1 percent per day, but we feel like it's very likely in the near future, from what we found out today, that we may be able to decrease this. So, under worst-case conditions right now, we expect that we would be somewhere at about 70 percent TACS at the time of Skylab 2 lift-off. Even with some of the maneuvers that we're contemplating, which will use some TACS for the rendezvous, we still feel like that we're going to be somewhere in order of 25 percent above what we need to go ahead and conduct a completely nominal experimental mission for both Skylabs 2, 3, and 4. So, no problem in that area. As I did indicate, we did have several maneuvers where - what we were really trying to do was to correct for the rate gyro

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drift, and also to optimize our momentum buildup. We have been discussing today the fact that we may have had, due to the elevated temperatures, some outgassing in the habitation area. Just exactly what type of outgassing that we may have had is under study, both here and at Marshall. A lot of testing is going on in this area. Again, if it does turn out that we do have some outgassing products that we would like not to have in the vehicle when the crew inhabits it, enters the area, we feel like there won't be any problem there, cause as you are probably well aware from what we've done in Apollo, we can - -

END OF TAPE

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SPEAKER - it enters the area. We feel like there won't be any problem there because, as you're probably well aware from what we've done in Apollo, we can very easily clear these things simply by depressurizing the vehicle and repressurizing the vehicle again. In fact, we probably have a procedure like this due to RCS contamination that we may experience if we do a stand up EVA. So this is really nothing new, and we certainly have more than enough consumables in the area O2 and N2 to accomplish this if this should be required. We have, this afternoon, gone ahead and decreased the habitation area of pressure from 5 psi to 4 psi and that was completed just a few moments ago. We took it down this initial step merely to give ourselves some baseline information to see whether or not decreasing the pressure in this particular attitude would have any adverse effects on our momentum build-up and therefore some effect on the TACS budget. We found that it had absolutely no effect whatsoever, so we're confident that if a depressurization is required, in order to purge out the habitation area, that there cretainly would be no problem as far as effecting any other system. I think that we can say that all of the planning is progressing very well. There are still many options that are being discussed in several areas, but the finding is progressing very well. And right now at least, I don't think anyone that I have talked to has given any indication that we're not going to be prepared to go for our scheduled 13:00 GMT Skylab 2 liftoff on May 25. And in case the figure hasn't been quoted to you, I believe the window on that particular launch is about 9 minutes long. I think the, just to give you a few words as far as the rendezvous flight plan is concerned, we're not talking anything significantly different from what we would expect to fly in the nominal mission. It will be an M=5 rendezvous. There will be a little variation in the actual maneuver sequence for the workshop, there again trying to keep ourselves optimised from a thermal stand point. Several literations on that are in work at the present time, and should be able to have a better feel for that sometime in the next one and a half or two days. We have done some work as far as items that we are adding and deleting from the command module stowage list. And Milt, maybe you can help me here, has this been covered it all? We are for instance carrying up a whole new load of EREP film. This is not something that is abnormal for say a Skylab 3 mission. We did have the EREP film aboard for Skylab 2, but we normally expect to resupply

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with the command module the EREP film for Skylab 3 and Sklyab 4. We are carrying up some additional photographic equipment to give us a chance to get better photographic coverage of the workshop, if we do the SEVA. We are also, of course, and George may be able to add several additional words to this. We are also carrying up several items of course that are associated with the various mechanisms that have been discussed with you as far as providing the thermal protection for the habitation area. And several additional pieces of euqipment that are associated with the stand up EVA. As far as the food is concerned, I think, I don't know whether or not there are any specific plans as far as carrying up additional food other than what we normally would expect to carry up in the command module for a nominal mission. We do feel like there are probably 4 or 5 items that have meat products- -

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PUDDY - a nominal mission. We do feel like there are probably 4 or 5 items that have meat products in them, that may be on the debatable list as far as quality, but the medical people here are examining that right now and I don't think we expect to have any problems as far as the menus are concerned. As far as medical samples, or medical equipment, I think most of that has been examined, and in general, we feel like we're in pretty good shape here. There may be some drugs that are - that would have to be resupplied. But again, these are all very minor in nature. So, the general trend that I'm trying to give you here, is that, in general, we are not expecting to make significant resupply, except in the area of items that are necessary to go ahead and deploy the alternate device for the meteoroid shield. As far as a gross timeline is concerned, right now we're talking day 1 being the rendezvous and the SEVA, and of course, at the present, our present plan is, that we will have a soft dock as they prepare for the SEVA, and then we'll undock and go ahead and accomplish the SEVA. And the only reason we're doing the soft dock is merely to give the crew time to go ahead and make the preparations without the additional task of being required to stationkeep. Day 2 is AM MDA activation, and possibly an OWS entry for EVA ATM's, if we go that particular route, as far as the deployment of a mechanism. Day 3 would be an EVA. During the night of day 3, we will be doing some ground commands as far as activating the ATM experiments. On day 4, we plan to spend about a half a day to bring the OWS up to the status for habitation. The afternoon of day 4 is more or less considered excess time, such that anything that has been unforseen, we've got time to take care of that without crowding the crew timeline. And on day 5, we will go ahead and start on our orbital operations. I think all in all, things are beginning to gel, and very shortly, I think we can expect to see most of the major decisions being made, and from the standpoint of the on-console team, we feel like we have the vehicle well under control. We're learning a little bit more about it each day, and have all the confidence in the world. That's about all I have.

PAO Did you have something, George?

HARDIE I might add a few comments about the solar shades, the various concepts that I mentioned the other day that were being looked at. We still have several concepts for the solar shade under consideration, and well into the stage of evaluation, and in some cases, even have some actual flight hardware ready to go. Two of those concepts are deployed by EVA. One is deployed by the standup EVA from the command module. The other is deployed by EVA, after docking from the airlock

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module EVA hatch. The other 2 concepts are deployed from inside the orbital workshop, through a scientific airlock that we have on the solar side of the orbital workshop. Both of these concepts that are being looked at, that would be deployed from inside the orbital workshop, would be deployed by the crew in a pressurized environment. It would not require depressurizing. The concepts that are being looked at are in work here at JSC, and also at Huntsville, and at McDonnell Douglas at Huntington beach. The crew has been to Huntsville, evaluating some of the concepts - -

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SPEAKER The crew has been to Huntsville evaluating some of the concepts in the water emersion facility in the neutral buoyancy facility. They will be in Huntsville during the early part of next week. The training procedure for the crew on each one of these concepts has been laid out, and they are in that procedure at this time. I would expect that in the next couple of days, that the concepts will be boiled down to at least two and possibly three coprime options.

SPEAKER All right wait for the mike would you please.

QUERY I have a good list of questions here, Don and George. First of all, I'm curious about the out gasing. What guesses would you have from where it might be coming from, and what types of things could it be?

SPEAKER Let me say that primarily we think the outgasing is from some of the foam insulations. As far as a detailed chemical analysis of just exactly what these products might be, I don't believe that work has been completed. Like I say, the exact requirement for this depressurization has not been completely finalized. What we were attempting to do today on console, was to determine whether or not there was any adverse effects as far as momentum and TACS usage was concerned from accomplishing this if it was subsequently required. George, you may have some later word on that than I do, but I don't think all of the chemical analysis of all the constituants that may be out gasing is known. They do know some of the items that could be outgasing, let's put it that way.

SPEAKER There are tests in progress on that and as Don says, we feel like the depressurization and repressurization time line that will be developed will take care of any concerns that we have for outgasing.

QUERY Another one. The temperatures you mentioned 100 to 110 stabilized in the living quarters. We were told yesterday, and I forgot now by who, in a briefing that it was 90 to 105 stabilization, depending on exact location. This seems to be quite a bit different, 100 to 110 is considerably different than 90 to 105. I was wondering has it climbed back up and exactly why?

SPEAKER I prefer to speak in terms of averages over the entire area. There are certainly areas in the habitation area that are down in the 90 to slightly above 90 region. There are also other areas that are in, let's say the 110 to 120 region. But an overall gas temperature inside the habitation area is running somewhere between 100 and 110. And we feel right now a realistic average is somewhere around 105 degree mark.

SPEAKER Nick.

QUERY You seem to be sounding even more optomistic today. And I wanted to ask you a couple of things. Are you really talking about completely nominal Skylab missions 2, 3, 4, when you continuously have new things cropping up such as this out gasing? And also,we have been told earlier, perhaps as much as 50 percent of the medical supplies that would have been degraded or deteriorated. Primarily, could you be specific about completely nominal Skylab missions?

SPEAKER Well, what I'm trying to say there is I have never been pessimistic. Let's get that one on the record first. I felt from the start that we had a good chance of being able to control the vehicle in an unmanned configuration to stabilize the vehicle thermally, and attitude control wise which are the two prime requirements I feel like, strictly from a stand point of ground controlling an unmanned configuration. As far as, when I say flying a nominal Skylab 2, 3, 4, mission, what I'm referring to here is the capability, assuming no other additional failures and assuming that we can deploy some sort of meteoroid shield which will allow us to go into our nominal attitude profile, I think that we can say that we can conduct the experiments on seperate missions that were originally designed to be conducted on Skylab 2, 3, 4, nominal Skylab time frame plan. I think that, and George may have some comment on this, I think that in general, most of the designs that we're talking about for an alternate shield do preclude those few experiments that were scheduled to be executed from the plus Z SAL.

SPEAKER That's correct.

SPEAKER But as far as operating the ATM experiments, as far as limited Z local verticals for EREP operations and this is primarily a power consideration type thing here, as far as the biomedical experiments and as far as the majority of the corallary experiments, I feel we can operate them. Now it may not be that we can operate all of these experiments as rapidly as we would like to. In other words because of power constraints, we may not be able to operate a preponderence of these experiments simultaneously, but we can accomplish those experiment operations.

SPEAKER I'd like to make one comment with respect to the lead into your question there. Talking about the outgasing as it might relate to a long term mission. I'd like to emphasize that the outgasing

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we've seen has been due to the very high temperatures that we saw during the initial part of the mission. And that's the reason, of course, we wanted to take the pressure down and allow the atmosphere to leak out. We do expect that with stabilization that we've seen, that the lower temperatures now and with the even lower temperatures that will see after we deploy the shield, then our concern for outgasing under those conditions would not continue. So that would not have any direct effect at all on the length of the mission.

SPEAKER Let me also add to that one that the cycling or the depressurization and subsequent repressure-ization is also something, strictly from the stand point of purging of contamination is a nominal procedure and is also a procedure that nominally we follow between various missions. We do not leave the habitation area air-lock module MDA combination at 5 psi between say Skylab 2 and Skylab 3.

QUERY Then in other words most of the discussion we've had so far about the tail end of the mission 28 day mission, leave alone the 56, that the tail end would be severely curtailed, it really doesn't stand any more. Is that correct?

SPEAKER I think Don has said all ready, and they can say it again that the critical consumable for that part of the mission is definitely electrical power. Now the electrical power is there for the maintenance of the basic systems to stabilize the vehicle to maintain the crew. And one of the activities that is underway here and at Huntsville now, is looking critically at the things that we can do with less of, like lights for instance not as many lights on as one would otherwise have, in an effort to be able to get into that part of the mission, then to budget our electrical power so that we can allocate sufficient power to some of the experiments. I think it's certainly true that all of the experiments operating in a simultaneous or near simultaneous time frame, which by the way we never planned anyway in a mission would be impossible. There will be a good active power management, critical budget activity that will be required at that time.

SPEAKER We'll take a couple of more questions here, then we'll go to the Cape.

QUERY A follow up on Nick's question to see if you want to stand by this completely nominal 28 day - -

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QUERY - follow up on Nick's question, to see if you want to stand by this completely nominal 28-day, two 56-day mission, with your reduced power situation, and the fact that you are eliminating experiments on the first mission, before they've even seen the workshop.

PAO Want to try that one George?

PUDDY I'm sorry, Jim, I will be happy to answer that question. There is still a lot of investigation going on, as to just exactly what the detailed electrical profiles are going to be. The point that I was primarily trying to make is that we feel like we do have sufficient electrical power, at least during the time frame that the CSM can maintain its loads. We do have sufficient electrical power to accomplish the basic workshop electrical loads, to provide the additional loads that are required for habitation of the entire workshop, and to provide some excess for experiment operations. And we feel that that excess power, that is available for experiment operations, is sufficient to run such things as the ATM experiments, the biomedical experiments, EREP, for short intervals, and corollary. As far as how all of these are put together in a timeline for any given particular day is going to be a job that we had already accepted for Skylab, and that is one of a daily, real-time, flight planning exercise. And electrical power will certainly play a paramount role, as far as selecting those experiment options that we can run at a particular time.

HARDIE Now, we have Mother Nature working for us, in one regard, in this mission, with the scheduled launch date. We will now be in the latter part of the mission, we will be at higher beta angles, and therefore, in the Sun on each revolution, longer than we would otherwise be, and so, that within itself, is going to give us more power.

QUERY You mentioned you're planning a soft docking. Does that mean you've given up the idea that a hard dock might jar loose the solar array panels?

PUDDY Let me answer that one by saying that, we're starting out the entire, or the philosophy surrounding the activities, after the Skylab 2 crew arrives on scene, is highly dependent on what the crew sees, and is able to relay back to us. The commander of that mission certainly is given the option of what actions that he considers necessary. The reason I mentioned a soft docking is strictly to provide the capability of enabling the crew to go ahead and make the necessary preparations for a standup EVA without the extra workload of stationkeeping. Sooner or later, we are going to hard dock. All we're doing is precluding making the first docking a hard docking, because it's not required at that particular point in time to achieve our objective, which is merely to avoid station-keeping for a long period of time.

QUERY What temperature range and other conditions do you consider to find the habitation area as acceptable for entering?

HARDIE Well, there are several ways that the crew could potentially enter the orbital workshop. The way that we would expect them to enter and would like for them to enter would be in - essentially in shirtsleeves. I think with the temperatures that we're seeing right now, and expect to stabilize at, that we're still quite comfortable with a shirtsleeve entry. I don't mean by that the crew's going to be comfortable at those temperatures for any long period of time, but I mean of terms of their safety and the health and the well being of the crew the temperatures are not to the point that you would have to have for an entry, anything other than shirtsleeve entry. Now, this is going to depend to some degree upon what we expect the crew to do when they get there, and if there's a heavy task for the initial entry into the workshop, then the worktime might obviously have to be shortened. But, the sequence, which of course, Don has already referred to, that we would attempt to achieve, would be one in which the solar shade was deployed by the - if it was deployed EVA-wise, would be deployed before the requirement for crew entry. But, we're not - I don't think I've answered your question very well, but we're not at a point that there's anything that's going to restrict in a severe manner the crew entry because of temperatures. It's just obvious that the higher the temperatures the lower the workload that they've got to be submitted to.

QUERY Is your tentative timeline, which has on the night of day 3 activating the ATM, is that based on getting power from the solar array, that it would be fixed, or would you do that any case, no matter what the power situation was?

PUDDY Oh, I think this timeline that I have quoted you is based strictly on the power generation capability that we have right now. I'm not talking about any additional power.

PAO Okay, we'll go to the Cape and take some questions from there.

QUERY Two questions. And firstly, can you give us, even provisionally, any time by which you think the shield may be deployed by the SEVA method? At least a time, say by which, if a deadline, by which if it is not achieved, it has to be abandoned for that day at least? And the second question is, NORAD now reports, a large number of objects, I believe nine, either trailing or leading Skylab. Do you have any indication that one of these may involve part of one of the solar panels, in other words, may you have lost one?

PUDDY I, personally, have not looked at, or reviewed any of the NORAD data. So I'm afraid I could not comment on that question at all. As far as the length of time that we would nominally expect to be completed with the stand-up EVA operations, let me emphasize that this is a tenative flight plan, but we are talking about the end of rev 8. Hopefully that we would have the sail deployed, this is some 13 hours elapsed time after the launch of Skylab 2. Shortly thereafter, the crew would go into a post EVA prep. And, course doffing their suits, and stowage, and check gear, I think they begin their sleep period at around 06:00, local.

QUERY We got a timeline here, for TV viewing, rendezvous, and fly-around, based on a 09:02 lift-off. Now, where the lift-off has been moved back by 2 minutes, I presume the same goes for this TV timeline, is this correct?

PUDDY I'm not sure exactly what TV timeline you have, or what flight plan you have. The TV that we would hope to get, all things being equal, is some TV over Guam, which occurs somewhere around 7 hours and 29 minutes, excuse me, that'd be about 7 hours and 30 minutes into the mission on the Skylab 2.

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PUDDY - 7 hours and 29 minutes, excuse me, that'd be about 7 hours and 30 minutes, into the mission on the Skylab 2.

QUERY Does anybody know, please, how many astronauts are now working on simulations and so on, or whether this situation will affect the plans for Stafford and Deke Clayton, and various people, to attend the Paris airshow?

PUDDY Let me say, that I'm sure that the entire astronaut corps is involved in some way or other, in working with the flight control teams, in one form or another, in making sure that we have a total integrated approach to this operation. As far as whether or not some of them are going to be able to attend the Paris air show is - that's completely outside my ball park, and I'm afraid I couldn't answer that question at all.

QUERY For Mr. Hardie. You mentioned that there are two new techniques being studied for the deployment of this solar shield, and that these two techniques do not require EVA. Exactly how will they be deployed, step by step, if you can?

HARDIE I think these techniques are - have been mentioned earlier, so I didn't want to introduce them here as completely new. They are deployed through the scientific airlock, which is located on the solar side of the- at least one of them, we have two, located on the solar side of the vehicle. Now, we have onboard the Skylab, in the orbital workshop, an experiment, or have several experiments, that are deployed through that scientific airlock. But one in particular, has a large box-type affair, that goes with it, that is mounted directly to the scientific airlock. It protrudes back into the orbital workshop, and the experiment, after the scientific airlock door is opened, the experiment is put into space, extended into space with pushrods, that are mounted onto the box, with the crewmen actually pushing these out into space. They remain attached, but you can push them out various distances out from the side of the orbital workshop. We're looking at two schemes or two different designs that would go inside of this box attached to the scientific airlock. The scientific airlock door would then be opened, and in much the same manner as these experiments are deployed with push-rods through the side of the box, by the crewmen, they would deploy, then, the two devices. Now, one of them is an expandable structure that would be deployed from the scientific airlock by the crew, and then it would be - it would expand, under a very small pressure, and would then align itself in the right position, of course. The other one is completely mechanical. That expandable structure, by the way, is being investigated and developed at McDonnell Douglas, at Huntington Beach. And here at JSC, they are looking at a device that would be deployed in much the same way. However,

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it is completely mechanical, and it's folded with spring-loaded joints, into a very small and compact package. But, once extended into space, it will simply unfold, and provide an umbrella.

QUERY . . .

HARDIE Well, I can't tell you exactly, but basically, a square and rectangular when it's folded. And the size of the solar shade and umbrella, or sail, or whatever name you want to give to it, that we're looking at, generalized, at about 20 by 24 feet, I believe. This size has been changing a little bit in the last few hours, because we have to design it to the thermal requirements to get the protection that we want.

PAO In answering the question concerning the ASTP crew, it's uncertain at this time whether all three members will be able to make it, but at least one member of the crew will be present at the Paris Air Show, and maybe more.

QUERY Stephen ... WACC News. About how long after deployment of the solar shield will temperatures drop to normal, and what is considered normal?

PUDDY We are right now running computer models which simulate the thermal conditions, both outside thermal protection of the shield and the thermal conditions inside. We do expect to complete these models within the next few hours, in fact. From these models, we can predict, then, the profile at which the temperature will drop. I think we're talking in terms of a large number of hours. I don't think we are talking in terms at all - in fact I'm positive we're not talking in terms of a large number of days. So, we expect, once we get the shields out there, and the shade out there, that the temperature will come down quite satisfactorily. Now, initially, the thermal control system, with the shade, and with active cooling, we have heat exchangers to provide active cooling, in the orbital workshop, too. The active cooling comes from the airlock module, that has the radiators and the cooling loop. But initially, we had designed the orbital workshop to be controllable, in a range that would normally be about 70, 72 degrees, which would be basically about the condition that you would have your house. We expect that we will be slightly higher than that, as a normal temperature, with the solar shield deployed, and with the actived cooling employed. By slightly, I wouldn't want to quote a number, because the analysis is still continuing, the thermal models are still going, but quite confident that we can with this design, make the environment comfortable and livable for the astronauts.

QUERY Yesterday you mentioned a shepherd's crook . . . a specific tool to be used in this mission.

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Are these tools modified or adapted from existing tools, such as those used on the Apollo missions, or are they completely new ones that you've had to develop?

PUDDY Well, there are a lot people involved in searching around for both ideas and existing tools that might be used. Tools that are used by linemen or working on power lines, tools that are used for special cutting of tree limbs or anything of that nature are being investigated. And some of those tools have been, have become available, and are at Huntsville, as well as here at JSC for investigation. Now one would expect that there would be some of those tools that would be usable in their current state,current design. There will be others where the concept will be adaptable, but because of the size of the tools, they will have to be redesigned for weight saving purposes. We have these tools for the flight crew to evaluate, and we want to be prepared to take up any kind of tool for just about any kind of purpose, that they or the engineers can feel like that they might have a use for. So, the tools are in a collection process right now. But tools of all sorts are being looked at.

QUERY I didn't understand you answer a moment ago about a large number of hours, and a small number of days, and so forth. Could you say - -

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QUERY I didn't understand your answer a moment ago about a large number of hours and a small number of days and so forth. Could you say, give us a better feel. Are you talking about perhaps 2-1/2 to 3 days to get down to 70 degrees in the OWS or perhaps 24 hours or just what do you mean a bit more specifically than that even though I understand you haven't seen the profiles yet.

SPEAKER I think that we're talking about something between 24 and 36 hours. It's possible that I can be off there as much as 8 hours either way. But I do feel like it's in that ballpark.

SPEAKER All right, do we have any more questions here in Houston?

QUERY Mr. Hardy, I don't quite understand the shape of these scientific airlock type umbrella or air mattress configuration. Twenty by 24 feet, they will be rectangular shapes.

HARDY That's correct.

QUERY And will they have reefing lines or some method of being able to be reefed?

HARDY They will have essentially extension or stand off from the scientific airlock itself, and they will remain in place as they are deployed from the scientific airlock. The concept at this time did not imposulate the requirement for or the existence of reefing lines from each corner or tie downs or anything of that nature.

QUERY But as I understand it designs on the Seva shield and also the airlock module shield they use, would have reefing lines so that at the end of the 28 day mission because of high Beta angles and such, you would change the configurations prior to leaving them.

HARDY I understand your question. The concepts that are being looking at are considering whether the final design will have this feature or not, I don't know, but are considering the possibity that the rectangular shade could be rotated slightly to allow more of the projected area of the surface to be exposed and therefore more solar energy to come in. However, the twenty by twenty-four essentailly provides a maximum coverage so there is not really anything you could do to cover a larger area. However, that does cover essentially the entire projected area of that side of the workshop. Does that answer the question? Well, let me try just one more time. Since we're covering a rectangular area, if you rotate it 90 degrees, now we're going to cover a twenty by twenty instead of a twenty by twenty-four. So we can

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vary the area that we are coverng by some rotation of that rectangle.

QUERY I've just been wondering why the EVA and SEVA type approaches seem to dominate over the scientific airlock type. Is that just because because of the difficulties of manufacture and the time involved?

HARDY One doesn't know for an absolute fact that the scientific airlocks are operational. It is possible although we don't have any reason to know that now, that some piece of meteoriod shield could be in a position to block the scientific airlock. We have done analysis, we know what the temperature on the scientific airlock is and we've done analysis to assure ourselves that the seal on the door and that the mechanism itself that opens and closes the door can withstand those types of temperatures. But, in the event that the scientific airlock was not operable and at that all your eggs were in that basket, then you'd be in a little bit of trouble.

QUERY I've got several questions. Don, do you know how much of the SEVA will be on TV, if any? I mean other than the fly around and looking at it, I'm talking about the actual deployment of the shield on the SEVA fashion.

PUDDY I think just because of the ground coverage time line that we have right now, and we are going through some reassessment of just exactly what the SWS attitude profile is going to be during that particular time from. I think it would be very difficult for me to quote exactly what the TV coverage is going to be. Let me just say, that we have certainly taken that into consideration and we're just as interested in seeing it on TV as I'm sure you are, and we are going to try to maximize it, but as far as an exact TV schedule, until we have a completely defined flight plan, I would hate to quote that, but I will make sure that you get that information as soon as it's available.

QUERY We keep more optimistic outlooks toward repairing at least one of the solar panels or maybe doing something with it. I'm curious why we've, you know the changing the mind. At first it was the impossible, nobody, it couldn't be done, and now we're taking tools along and we're more confident that it's possible that one of them could be fixed. And they keep talking about one, I'm curious why only one of them, and which one that it would be.

PUDDY I think in general the wing tyat we are talking about, that we feel that we have some feeling

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that we may be able to fix, and I'm not saying this is positive in any stretch of the imagination, but some feeling is wing 1. And the reason that we feel a little more confident on this particular wing, is from the stand point that as I indicated to you a couple of evenings ago, we did not lose the secured indication, which meant it was still completely attached to the workshop structure until after we had actually ground commanded that particular wing to deploy. We have also seen some indications as has been reported to you of some fluctuations and SAS voltages and SAS currents. It would indicate that we might be getting a small degree of charging, in other words on one of the outboard wing sections of which there are three associated with the OWS SAS. We may have had partial deployment there and as George Hardy just pointed out to you, we are not sure just exactly where the meteoroid shield is wrapped around, and it is possible, I won't say it is very possible, but it's possible that a portion of the meteoroid shield has restrained this particular wing from deploying. And if that is the case, then removing that may indeed allow that particular wing to be freed and to go ahead and deploy. It does not take much force at all. In fact, correct me if I'm wrong here George, but I think the force normally is around 2 pounds, that would be required to restrain that wing in the nondeployed position, after it had been released from the structure.

QUERY The first part of my question was asking about why the change in thought. Somebody came running into Mission Control one day with the answer or did everybody start thinking about it more seriously and come up with kind of gradual ideas.

PUDDY Well I think that as we gathered more and more of the data, as to exactly the sequence of events the possibilities of just exactly what the status was of the meteoroid shield we felt, everything has been evolving. And we felt that there was a possibility that this could be the reason that the wing had not been deployed and that our intent is strictly to be totally prepared for anything that we might encounter and if that is all that is required to deploy that particular wing is to say move a piece of meteoroid shield out of the way, we certainly would want to have the tools and the training. Crew training as far as observation and this type of thing squared away such we would be able to do that. And that's what we're working on at this time.

QUERY In addition to your limitation and stowage on the CSM, can you say how much in weight you're taking off and how much you're putting on. What's your limitation in weight as well as actual area is concerned.

SPEAKER I cannot quote to you the exact weight figures. I haven't heard any concern expressed that we were carrying more, a tremendous increase in weight. We are adding certain items that are associated with the devices that we would use to provide the thermal protection. We are also adding, as I indicated earlier, some replacement film and some equipment and there are several items - -

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SPEAKER - the thermal protection. We are also adding, as I indicated earlier, some replacement film, and some equipment. And there are several items that we are deleting. Some of these are associated strictly with experiments that we normally expected to carry with us, that are associated with operation outside of the plus-Z SAL. So, there have been items added, there have been items deleted, but as far as the delta in weight, I cannot quote that figure for you, I'm sorry.

QUERY Are there any experiments other than the ones associated with the solar airlock, that might have to go by the board, because of this stowage business? Things that might have been returned, for example, at the end of the mission?

PUDDY Again, let me say, that I haven't been directly associated with all the detailed experiment planning that has been going on in one of the off-console teams, but in general, I feel the answer to your question is, no. If there are experiments, they're going to be very few in number. George, do you know - -

HARDIE No, I would agree with that, I don't know of anything right now we've identified that we would have to leave home because we don't have storage to bring it back. Neither do I know of any experiments in their totality, other than the ones that operate out of the solar scientific airlock, that would be lost. But, as we mentioned earlier, there may be some, due to film allocations, and in power, and in things of that nature, that have to be budgeted.

QUERY On the outgassing. Can you say what made you turn to that question today? And, also, what would be the - would there be any significant deterioration of the material that is outgassed?

PUDDY I think as far as what made us turn to it today, we have always investigated things that - we get into an abnormal situation either thermally, or from the standpoint of pressure, we always go in and look at all the possible ramifications of that type of thing, on the mission profile. And, as you are probably well aware, there have been many, many, things under investigation, and this is one that before any concern at all was expressed in that area, we wanted to make sure that we had some data, so there have been some of the substances that could possibly have some outgassing byproducts. These have been actually tested in various areas, and, by heating them up to the temperatures that we thought we did arrive at in the habitation area - and like I say, the chemical analysis hadn't been completed on that but - we're assuming that if there is a problem with the outgassing on this, of some product that we'd like not to have in there no matter

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how minute it may be, we feel that we can take care of that without any problem by depressurization and subsequent repressurization.

PAO Okay, we're going to have to cut it off here, now. For your information, the news center, here, at JSC, will be open from 8 to 5 p.m. on Saturday and Sunday. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Johnson Space Center

CHANGE OF SHIFT BRIEFING
Johnson Space Center
May 18, 1973
9:00 AM CDT

PARTICIPANTS:

Charles R. Lewis, Flight Director
John E. Riley, PUulic Affairs Officer

SL-1 PC14A-1
Time: 08:56 A.M. CDT
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SPEAKER Okay, we're ready to get started. Flight Director Chuck Lewis this morning who has been leading the Mission Control shift since midnight, he'll give us a status of the vehicle as now.

LEWIS Okay, basically there's not much change in the status. We're still using this pitchup 50 degrees for thermal considerations and it certainly appears like we've reached a point where we've got the temperature stabilized. We've got a reasonable solar cell battery configuration for maintaining the energy we need and one thing we did start doing last night is using some temperature measurements and some data from the solar cells to determine attitude. We would normally rely upon our rate gyros for that but since we've been in this pitchup attitude they've drifted off somewhat. And to update them, make then correct, you need to go back to the solar inertial mode with an ACS sun sensor and we don't want to pay that price, going back to solar inertial and going back into the thermal problem again. Takes some length of time for every - we estimate for every hour you're in solar inertial it takes about 13 to 14 hours back in our pitchup attitude to recuperate the thermal penalty. So with some thermal measurements that we're using and the solar cell electrical characteristics we think we've got a real good handle in attitude and can stay that way for sometime. That's basically about it; not much change.

SPEAKER Any questions?

SPEAKER David Salsbury.

QUERY You've been - been in the process of trying to control and refine your techniques on how to control Skylab now for a little while. I just wondered if you could pin point anything - you know what you've really learned about some of the characteristics of Skylab as a satellite and the techniques of controlling it?

LEWIS Well, basically I think we've learned that our attitude - our computer system and our attitude control system has worked together, control attitude works very well. We determined that prior to getting up to this pitchup attitude we're in. So that system looks like it is functioning very well. We're certainly learning a lot about thermal characteristics of the vehicle and we've got I think a very good handle on that. Electrical power we've - because we are limited in power we - we've got a very good handle on that. And of course we've been working offline to work up minimum power requirements for additional operations, living in the OWS if we can, if the fix works in our experiment operation. So we're baselining a lot of that data.

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So it's, basically, the control systems works fine, the thermal - the ATM electrical systems working fine and if the fix works we ought to be in pretty good shape.

SPEAKER There's a question back here.

QUERY What's the average temperature inside you recorded last night.

LEWIS Well it seems like we're still stabilized somewhere between 100 and 110. Somewhere in that range. It doesn't appear to be decreasing; but it's no longer increasing.

QUERY Even with the pitchup?

LEWIS Pardon. Yes.

QUERY Even in the pitchup.

LEWIS Yes.

QUERY How far have you gotten in some of your power management plans? Take the worst case, say that you don't get the solar panels fixed - the one solar panel fixed, how are you going to reduce the mission? What experiments are going to be cut out? What are going to be cut down?

LEWIS Well let me say this, we haven't got as far with the experiment power requirements as we have with the basic power requirements. We've got I think a very good handle on the - what we have to power up for living conditions in the OWS. Of course we've worked the airlock module MDA power configuration - -

END OF TAPE

SL-1 PC-14B/1
Time: 9:01 a.m. CDT
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LEWIS - what we have to power up for living conditions in the OWS. Of course, we've worked the airlock module MDA power configuration when the crew enters that, and we've deltaed for ATM operations; we know about what that's going to cost us. We have worked some power deltas on the EREP experiments. We have that information. I really haven't seen it all tied together yet to give you an idea of what experiments we can conduct simultaneously, and so forth.

QUERY Can you put some figures or some more detail than what these basic conditions are. And the ATM how much of the ATM, and what are the plans now for EREP.

LEWIS I don't think I can right now. I can say this, that it looks like, as far as electrical power capability, we've got about 4500 watts in the ATM system. We think it's going to require somewhere around 3000 watts for operational power, and we have somewhere between 1000 and 1500 watts for experiment work. And, for example, an ATM OPS would require around, as I recall, somewhere around 500 or 600 watts. So we could operate ATM, plus maybe a medical experiment, you know. We can do some experiments simultaneously.

QUERY Do you have any update on the crew activities?

LEWIS On the crew activities presently training, and so forth? No, I really don't. The last -

SPEAKER We should know that in about an hour, or within an hour (garble).

LEWIS I think Rusty's at Marshall. I don't really know what their schedule is.

PAO We have some questions at the Cape. Let's go there and take those.

QUERY What is the status of the required flight plan right now, and where is most of this - the computations or the revisions being done? Is it being done simultaneously at Marshall and Johnson Spaceflight Center?

LEWIS Okay, the first question. We've basically got our activities defined and timelined for day 1, the rendezvous, the inspection. We have an option in there for a standup EVA for one of the fixes. We have that basically worked out; we've modified crew checklists to reflect that timeline. And we've done a lot of that basic work here; some of it;s been confirmed or validated by the Marshall people. We've done that basic with these offline flight control teams. And, what was the second question? And day 2, I must say, day 2 we've got basically timeline.

QUERY What percentage of the flight plan has been completed now, at this time?

LEWIS Oh, we've got day 1 basically completed. Day 2, day 3, and at that point - and part of day 4. Now, day 2 is the entry into the airlock module MDA, and also entry

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into the OWS for a short period of time for some transfer items, in the event we have to do an EVA from the airlock module on day 3. And day 4 is entry into the OWS again for other items - transfer items. And perhaps if the fix is - works, and the temperature comes down, we may do a bit more on day 4 in the OWS. Day 5, if everything goes well, we would probably initiate some of the experiment work - limited experiment work.

QUERY If we (garble) already, what you are going to tkae out of the command module to stow all that additional equipment; you have the two sunshields, the pole, and so on. Or more generally speaking, how did you solve this problem?

LEWIS I can't answer you specifically because I haven't really been working the stowage problem; another group has. I know they've had to delete some items from stowage; I don't know what those are. And, of course, like you mentioned, we've had to add stowage room for the thermal fix and other items, but I'm not that familiar with the stowage problem.

END OF TAPE

and other items, but I'm not that familiar with the stowage problem.

PAO No more questions from the Cape.

QUERY I've got a couple of questions. I've - what are you going to have to turn - do you know what you're going to have to turn down in the CSM to get this extra 6 - 800 watts of power this 15 to 17 days, and also what affect will the maneuvering for the standup EVA have on this power from the CSM?

SPEAKER Okay, we have worked up a minimum power configuration for the command service module to increase the duration of the fuel cell life. That's been done, and we have that in modular steps. Now, I mean by that in some cases you could power-down too much. You would have a thermal problem with the coolant loop in the radiators, for example, in the command module. As far as the effect of the command module - the power required for the command module to do the SEVA, I don't know how much power it's going to take and we - really I don't think we've examined that from a power point of view. It's something that if we do the SEVA then we're going to pay that price cause it's going to be for the benefit of the program, so we really haven't, I don't think, delted that power.

QUERY What percentage of the drugs do you think have been spoiled and what kind of drugs are they? What's the name of them?

SPEAKER I really can't answer that. The medical people have been working that and, like I said, I haven't seen the stowage - I'm not familiar with the stowage list, which would - if they do have drugs that need to be replaced, they'd, you know, of course have to take them up. I really don't know. Some of the people from the medical directorate might be able to help you there.

QUERY You've mentioned a couple of minutes ago that by day 5 they may start on the experiments. Do you have any fix as to when they might move into the OWS to live there?

SPEAKER I really don't. If the fix does work and the OWS begins to cool down I don't know how long it would take it to cool down to the point where we would want the crew to set up living quarters. I really don't know.

QUERY Suppose the crew goes up there and erects this heat shield and we turn out because the timeline is slipped back and you're going to have a higher beta angle and you're able to salvage a majority of the mission. Have you got any feelings about, you know, what the signi-really haven't thought much bey immediate problem. Certainly, if we can get up there and

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clean up the vehicle and deploy the shield and make such a fix, assuming it's all successful it would certainly, I think, point out the benefit of a shuttle-type system for satellites, for example, the deployment of satellites. If they don't activate possibly retrieve them at that point and bring them back or there may be some things the crew could do, you know, while in orbit. I think it would, you know, demonstrate that type of capability.

PAO Okay, I've got a rundown here on crew activities for today. Prime crew Pete Conrad and Joe Kerwin are practicing unsuited workshop flyarounds in the command module simulator this morning. Paul Weitz is doing a standup EVA walkthrough on the thermal curtain deployment procedures from the command module.

END OF TAPE

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PAO procedures from the command module. This afternoon Joe Kerwin will be briefed on operational inflight procedures, such as systems management with reduced power and the new timelines and new checklists. The backup crew, Rusty Schweickart and Story Musgrave, are running through EVA procedures in the water tank at the Marshall Space Flight Center. It's expected that they will probably return to Houston tonight. Bruce McCandless is coordinating development of the modified checklists and crew procedures documents at the Johnson Space Center. Any further questions? We have more questions from the Cape? Okay, let's go there.

QUERY Jack, one more question. Are we to presume that when the Skylab 1 crew puts either shield or sun bonnett over the workshop, that it will remain in place for 8 months and that docking and undocking by other crews to come wouldn't jar it loose?

SPEAKER Yes, you can make that assumption.

PAO Okay, thank you.

END OF TAPE

SKYLAB NEWS CENTER
Johnson Space Center

SKYLAB STATUS BRIEFING
Johnson Space Center
May 17, 1973
12:30 PM CDT

PARTICIPANTS:

John Disher, Deputy Skylab Program Director, NASA Headquarters
William O'Donnell, Public Affairs Officer of NASA Office of Manned Spaceflight

SL-1 PC13A-1
TIME: 12:28 p.m. CDT
5/17/73

PAO Okay, we have with us this afternoon, Mr. John H. Disher, who is Deputy Director of the Skylab Program from NASA Headquarters. John.

DISHER Thanks Bill. Gentlemen, I'd like to read a statement and then I'll be available to answer questions. The statement is as follows: A decision has been made for the crew of Skylab 2 to install a sun shade on the Skylab now in orbit. With the sun shade installed, we will be able to carry out a nearly normal mission and do most of the experiments originally planned. To have enough time for design, frabrication and testing of the necessary hardware and completion of the necessary training, operations planning and restowage of the command module, we've decided to delay the Skylab launch to May 25th 1973. The conditions aboard the orbiting Skylab are stable and the flight controllers are able to maintain the temperatures at an acceptable level, while still developing sufficient electrical power for basic operation of the systems. Two approaches are being developed for the sun shade. One approach is based on deployment from the EVA station normally used in going to the ATM for film retrieval. The other approach is based on standup EVA from the command module with the command service module maneuvering along the outside of the Skylab to deploy a sail-like sun shade device. We plan to carry both approaches on Skylab 2 in order to give maximum flexibility in carrying out the deployment in orbit. The May 25th schedule decision will be reevaluated next week on the basis of status at that time. Now let me make a couple of amplifying comments here, with the aid of the model and tell you a little bit more of what we're talking about. First, with regard to the EVA deployment from the normal ATM film retrieval station, we're talking about the crew performing essentially the same exit maneuver as they would for film retrieval from the sun end of the ATM or the anti solar end of the ATM. They would relocate the portable stem or T-device. Stem or T-device is a colloquialism for a steel ape kind of device that unrolls about 30 feet out of a small box. It's rigidized by virtue of its shape so you can cantilever out a very light structure 30 feet. And this stem or T-device, as I said, is ordinarily used to transfer and retrieve film packages to the sun end of the ATM and it is portable, removable for reasons of reliability. It's build to be replaced in orbit. We do have a spare device which was fortuitous in the circumstance. We will plan to move the stem or T from its normal position to a position in this region which will allow it to unfurrow a triangular shaped shade down to a total length of about 42 feet from this area. Now, the stem, as I said, is only

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30 feet long so we will carry up three 4-foot long sections to extend its length to 42 feet in order to allow the roll out of the shade device from this station. The other device that - the other approach that I talked about EVA, standup EVA, from the CSM would be carried out by the Skylab crew either prior to docking or after docking and a nights rest at the discretion of Pete Conrad, the onboard commander. The EVA approach entails a deployable sail carried in a package much like a packed parachute. The spacecraft would have the operating crewmen standing up partially erect in the command module hatch. The command service module would maneuver in this attitude to an existing structural attach point on the aft end of the workshop, would attach one corner of the sail, if I may call it a sail, would back off, play out the unfolding sail, move laterally over to another point of existing structure, move in attach the second corner. I should go back and say, there are 3 attach points. You start out with obviously all three cords or lines inside the command module. After the first one's attached, you still have 2 inside. You play out the shield, move over to the second attach point, attach that with a 10-foot long wand or tool, if you will, back off, slowly unplaying the sail and translate forward slowly and all the time playing out the sail and then attaching it to existing handhold structure at the sun end of the ATM in this region, again, with approximately a 10-foot long wand while the CSM is standing off, approximately that distance. The sail would then be tightened with a jam clamp, if you will, much like a sail boat cleat, jam cleat. The line would be pulled taut to bring the sail into a triangular deployed position covering approximately that area and giving in effect, a complete sun shading of the inhabited workshop area. Now, with that very brief summary, let me attempt to answer questions, if I may. Yes? Oh, sorry.

PAO Wait for the mike please.

QUERY The latter method, which you described, appears to give the better shading, is this the first desired method and the second more or less a backup?

DISHER Yes. They both should give, essentially, equal shading. The first is the preferred method and we will try it first based on the fact that we can get the shade deployed earliest. That's the reason that is preferred to try first.

QUERY Are the shades the same shape and dimension in both cases, and if so, what are those dimensions and what is the shape? You said triangular, but how big really?

DISHER The one that is attached back here is a long trapezoid. The one that would be deployed from here is more

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rectangular in shape. And approximately a 20-foot square would be deployed from this region, a trapezoidal shape tapering from the approximate 20 feet here to something about half that in this region would be planned.

PAO Roy Neil.

NEIL First of all, I'm just a little confused by your answer John. I think you were trying to say the second method that you showed, the second method would be the first to be tried?

DISHER You're right.

NEIL Just wanted to clarify that.

DISHER Sure. Fine. Okay. I reversed the order of my description.

NEIL The followup question is launch time. What are you looking at, 9:00 A.M. eastern?

DISHER Let's see, as I recall it's 9:02 eastern daylight time, Roy, with again, a 10 minute window. Did you want me to recognize the - or will you, Bill?

PAO I will.

DISHER Okay.

QUERY What will it be; an M=5 rendezvous?

DISHER That would be our nominal plan, but Pete would have the option to make it a later on a real time decision basis.

QUERY Whose making the hardware?

DISHER It will be built inhouse here at Johnson Space Center and at the Marshall Center.

QUERY Which - I mean which is - -

DISHER The Houston Center is building the hardware for the CSM deployed and Marshall is building that for the airlock deploy.

QUERY On the first alternative, I don't think you mentioned how you would tie that down.

DISHER Okay. The Marshall approach. I'll describe them both. The "approach reeled out on the stem" is cantilevered, it's not rigidly tied down. The other approach is attached to tie points at the three points.

QUERY Is there any maneuver for getting out of place then?

DISHER The rigidity of the boom itself, no. It's possible, as we proceed in the next several days with evaluations of the actual regidity, it could be necessary to devise a snag point at the power end to - -

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SPEAKER In the next several days with evaluations of the actual rigidity, it could be necessary to devise a snag point at the far end to tie that end. But our thought is that it may be feasible simply to cantilever. Of course, no loads other than the very slow maneuvering loads on the device.

QUERY John, as on the Marshall Plan, I'm not clear as to where the boom would be attached and on the MSC or, pardon me, JSC plan exactly what kind of attachment on the underside of the aft skirt have you decided upon? As I understand this was a bit of a hassle, too.

DISHER Let me say, first of all, both approaches are being worked jointly by the two centers. It is very possible, for instance, that the actual material would be fabricated here in Houston for both approachs. That's open, but the two centers are working together. Rusty Schweickart flew to Huntsville last night to do some on-the-site work with the Marshall folks. The actual attach points, the existing structure in the aft region of the S-IVB entails some channel stringers and the intent there is to utilize a - an expanding plug type of device to pick up between those channels, a wedging kind of attachment. The details, of course, of the attachments are being worked out. They're not, in fact, defined completely.

QUERY Would the standup EVA crewman be able to see the underside, in other words, he'd take a pole to push this thing and make sure that it lodged securely? Because it sounds like he might make a couple of tries and it wouldn't catch and he might go floating off.

DISHER Well, we intend to evaluate that here on the ground with actual structure, certainly, and the detail of the attachment device to verify that we can do that in a foolproof manner is yet to be completed. The attachment for the stem will be a portable type of attachment to existing structure. The specific point, to my knowledge, has not been selected yet.

QUERY John, I wonder if you could discuss for us, just a little bit, the first things that will happen during rendezvous. I'm looking now at what would probably be a television inspection. Are you going to go at all for any attempt to fix the solar array on the workshop, that kind of thing?

DISHER Okay. The intent is that Pete would make a fly-around inspection first, survey whether there is, in fact, any dangling protruberances or things that could be a hazard to deployment of the sail, either from the back end or from the forward end. It's our intent to have some simple

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tools along that Pete could use off of the extending pole, at his discretion, to remove debris, if it looked to be practical on the spot. He would, based on that examination - and it is our hope also to have real-time TV relay to the ground, so that engineering inspection could be made on the ground so that is a restraint - constraint on our timing of this activity. We'd like to be over a TV ground station so that we can relay this. He would make that inspection. The pictures would be relayed to the ground. Judgment would then be made whether to attempt the deployment by the CSM mode. If the - if that judgment was negative, and it looked not feasible for some reason to go that route, but it looked promising to proceed internally, this - the aft attachment would be put aside, and he would then proceed to dock and work toward the internal deployment approach. There are several factors that have to be considered here. We have approximately 50 minutes of daylight available. Pete will need to assure himself that he can do the task in 50 minutes, or if necessary, stop and stationkeep during the dark cycle and resume the operation on the next daylight period. He has to consider what - Is the tasksuch that he would like to dock and take a night's rest for the crew before proceeding to try the external attachment. So that external attachment has to be evaluated first, the timing of it evaluated, the decision to proceed, or decision to dock, based on onsite examination of the circumstances. Yes. Now two aspects to that. First, do they present a hazard to either the docking or to the deployment of a sunshade? Or secondly, is there a possibility that with a very simple maneuver they could be freed, or at least one of them deployed? Right. There would be a tool on board, a shepherd's crook kind of a thing, that could again, at discretion, be used to jar loose a solar array if on the spot examination looked safe and fruitful.

PAO Okay. We'll now switch over to the Cape and take some questions from there.

QUERY To what extent, if any, was the delay made for the further training of the astronauts and for a rest for everybody over the next few days?

DISHER Well, certainly training of the crew is a significant factor in the decision. I think we could have had the hardware available by Friday but certainly there would have been little, if any, time for training with full scale replicas of the equipment. And so, certainl,y training was a major factor in the decision.

QUERY How about rest?

DISHER Rest for - rest for people on the ground? Are you speaking - rest for whom?

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QUERY Both the astronauts and the crews on the ground who will have to work during the mission.

DISHER No. That - I can't say that was not considered, but it was not considered to be a factor in the decision.

QUERY ,,, exactly what the three astronauts are doing in their training now and whether quarantine is off altogether?

DISHER No. Quarantine is not off. It's perhaps been compromised a bit by - or will be compromised a bit by the training activities. We're going to minimize any compromise through careful control of contacts, but it may not be possible to maintain the tight control over that that we've had in the past. The astronauts right now are being briefed, are participating in discussions of the several approaches and may be going to several sites for on-the-site evaluation of prototype devices. Am I coming through to the Cape all right?

END OF TAPE

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DISHER Am I coming through to the Cape all right?

QUERY Will Joe Kerwin - is he scheduled to go EVA under the prime or the Marshall plan? Another question is, when will the Skylab 1 prime crew come - all be at Marshall for training and cross training? Is it going to be required? And in that you're taking along extra food, tools, film, medicine, and drugs, and two sails, what else are they going to carry up with them, as far as extras, in the CSM?

DISHER Okay, on your first question, it would be either Dr. Kerwin or Paul Weitz. That decision has not yet been made. I don't yet know when the prime crew - or if for sure, the prime crew will be to Huntsville for trainin under water. Your third point again, please?

QUERY What are all the extras - -

DISHER Oh, yes, I'm sorry.

QUERY - the crew is going to have to carry up with them in the CSM.

DISHER Okay, yes. All right, the new items to be carried up will include the two different sunshades, the shepherd's crook, the three 4-foot sections to extend the T to a 42-foot length, the special 10-foot wands to enable the crew to attach the sail to the aft point of the stage, some consideration to a limited amount of replacement film for photographic film that could have been damaged by the exposure to the higher temperatures than origionally planned; in addition, a telephoto lens for damage assessment by camera. Those are the major items - those are the major items, additionally, that would be carried.

QUERY Red Moore, ABC. Does Pete have the option to combine the two EVA procedures, or must you always have all three astronauts in the command ship at all times in maneuvering with -

DISHER I'm not sure that I understand the question, but let me answer it as I do believe the intent. All three of the crew will be inside the command mmodule. The one crewman will be standing up with - his upper torso extending from the command module, for the CSM mode of deployment. Was that your question?

QUERY Basically, that's half my answer.

DISHER All right.

QUERY Must they stay there? Can you put one in the airlock and do something else with the other two, or do you need all three in the CSM?

DISHER We would keep all three in the CSM. It's not our intent to separate the three crewmen during this period.

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QUERY How certain do you consider the May 25 date to be? In other words, how high or low is the probability of another slippage?

DISHER At this point we have reasonable confidence we can make that date. But I intentionally said we were going to reassess it next week, and that will obviously depend on how well things go during the next several days. I think we can make it.

QUERY How close will the CSM actually get to the skin of the Skylab space station? And secondly, for the benefit of the people here at KSC who couldn't see you pointing things out on the model, --

DISHER Oh, yes, correct.

QUERY -- could you name the actual locations where they are going to be trying these things out.

DISHER Yes, maam. About 10 feet, distance of approach. The particular points that the tie downs would be are at the very aft end of the workshop near the TACS thrusters, if someone there has a drawing or a model to look to, on either extremity. Near the extremity back end of the work shop, a point on each side, the forward point would be at the Sun-end work station of the ATM, which is currently a station where the crew replace film in the Sun-end cameras of the ATM. Okay, those are the three points for the externally deployed approach. The attached point for the airlock hatch approach - first of all, the stem or T would be attached to structure in the immediate vicinity of the airlock hatch where the crew comes out to go on a normal ATM film retrieval mission. The shade, in that case, will be cantilevered back from the - from that attached point, with consideration being given to the need for a snub at the far end of the cantilevered sail. So that there is essentially only one attach point for the airlock deployed approach, with the possibiity of a far end attach point if we determine the need and determine how that can be done.

QUERY Has any thought been given to the idea of a joint US/Soviet linkup aboard Skylab in 1975, as opposed to the existing plan?

DISHER That's not really practical in the 8-month mission that we have planned here.

QUERY Just to make sure I have it right, the JSC plan, that is, the CSM plan is the prime and the Marshall plan, that is, getting out of the airlock, is the secondary mode of correcting the shade, is that correct?

DISHER We're going to try the one externally first because that has the advantage of getting the thermal condtioning, right off the bat. If we can't do that for some reason, we would then enter and proceed with the internal deployment.

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QUERY On the airlock deployment, how long is that shade going to be, from top to bottom?

DISHER The actual - the dimensions of the shade are estimated at 20 by 20 feet, and it would be extended about 42 feet from the extension point so that it covers a 20 by 20-foot area right over the inhabited area of the workshop.

SPEAKER Okay, we'll return here to Houston and take some more questions here. Ed DeLong.

QUERY Two questions. You just gave the dimensions of the airlock-deployed shade. What are the approximate dimensions of the other shade?

DISHER Okay, it would total approximately the same area, 400 square feet, but its trapezoidal shape would extend up further. It's approximately 20 feet at its apex, or its base, rather. I don't recall the lateral dimension - appear something on the order of 8 to 10 feet is my estimate at this point. That required to give approximately the same area but in a trapezoidal, rather than a square, shape.

QUERY And then by, approximately, say 30 feet long?

DISHER Let's see - well, I could figure the area, but 20 at one end and 10 at the other - 15 - about 25 feet, right.

QUERY After either of these is deployed -

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QUERY And after either of these is deployed, how long would it take for temperatures to drop until the astronaut - to the point the astronauts could actually live in the Skylab habitation areas, and where would they - how would they operate during those first few days?

DISHER Okay. The temperature should - they're probably habitable right now. The concern was for equipment inside. The crew would - immediately after deployment, successful deployment of the sunshade, externally, they would go into their normal activation sequence, which totals about three days of active work to set up housekeeping down here. Yes. They would sleep in the Skylab. Remember the first night, though, they sleep in the command module after their docking. So - in that - there would not be a change if we were able to deploy that externally. That, of course, is an advantage of the external deployment versus the internal deployment. You can get the sunshade stretched and get thermal conditioning before you enter and - thus preserving the effect of time.

QUERY If you use the airlock EVA, where will the other two astronauts be?

DISHER They would be - we would do it exactly the same as we do for an ATM film retrieval, with one crewman being at control station inside and one crewman being outside doing the work and the third crewman attending him, either standing up in the airlock hatch or immediately outside in that vicinity. Two crew would be, in effect, outside and EVA suited.

QUERY For CSM approach and deployment, who's flying the machine? Pete?

DISHER Pete.

QUERY Pete will fly, and then it will be either Joe or Paul, as far as the actual handling of deployment.

DISHER That's correct.

QUERY What's the proximity of the hardware that's floating around the cluster at this time? Will Pete be trying to maneuver around shrouds and things like that?

DISHER No. The only uncertainty is, are one or both of the solar arrays dragging in an unknown way? And we don't know the answer to that. The other hardware, the shroud and a cover for the radiator, are separated by some distance from the orbiting Skylab.

QUERY How does this 10-foot wand work to attach the ends of the sail to the base of the Skylab? I mean how - physically, how does it do it?

DISHER Okay, well it simply has a forked fitting on the end to hold the cleat or jam-cleat, if you will, for

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its attachment to the structure. The specific shape of it I can't describe to you at this point. We have some devices that we've used in the past that have been a simple two prong fork with suitable hold on it with a release for the device being installed, but it's just a little bit too early for me to tell you the specific shape of that. It may exist this moment, and I'm not aware of it.

QUERY With television now becoming such an integral part of this operation, what ground stations do you plan to satellite into here? Obviously, the stateside stations are available to you, but what other stations do you plan to use for video, on live feed to here?

DISHER Okay. Guam is available to us, and I believe Madrid, yes, in addition to the stateside.

QUERY Have you settled precisely on the material for the sail; if so, what is it? Could you describe it as to appearance as well as actual material?

DISHER Yes. The material that will most likely be used is an existing material that has been used in inner layers of the lunar suit. It's a very high-strength, lightweight material, resistant to radiation. Its three layers are Nomex, Nylon for strength, aluminum foil for reflectivity, and Mylar coating for combination reflectivity-emissivity. So it's a three layer sandwich, very light in weight. I don't know who makes it. We have a large quantity of it on hand, and, I'm sorry, I just don't know who makes it.

SPEAKER We'll try to find that out, Bill.

SPEAKER I understand we have some more questions from the Cape; so we'll switch back there.

QUERY The original heat shield was called a micrometeorite shield, presumably, to reflect meteorites as well as sunlight. Will either of the new shades protect the workshop it used to hit? And also, are you still planning to run one 28 and two 56-day missions at this time?

DISHER Okay, the shade will give surprisingly - it will give some substantial degree of meteorite protection from just the one direction. Of course, it wouldn't protect the sides nor the bottom, and it wouldn't be as effective as the original 025 aluminum, but it will have some effect, certainly. And I'm sorry I've forgotten your second question. I was visualizing the -

QUERY Are you still planning --

DISHER Oh, yes. 28 --

QUERY -- One 28 day and two 56-day missions or do you have some other kind of a plan; for example, two 28, back to back, or what?

DISHER We'll really have to determine the results of our fix on our first mission before I could give you a logical answer to that. Certainly, it's our hope that we'll find a way to do more than 28 days. That would depend on - are we able to get some effective solar power out of one of the, or two of the, workshop solar arrays, for instance.

QUERY We've been told that Joe Kerwin is practicing the airlock EVA in Marshall and Paul Weitz the standup EVA in Houston. Has the decision been made that these are the two which will do the - whichever EVA is decided on?

DISHER Certainly it would be one or the other on the EVA from the command module, and I think, logically, in the interior deployment, it would be one or the other also. But the decision certainly has not been made as to which.

QUERY What is your present best understanding of the situation with the solar panels that were damaged?

DISHER Okay. We think that - well, let me say first what we know. We know that one solar panel had a latch release early in the mission. We think that was caused by the meteoroid shield deployment and failure, and that appeared simply to be a latch release without any deployment. The other solar wing behaved normally. That is it did not have an early release. It's latch did release as planned when it was commanded to do so after orbit. Those facts, then, together with some sporadic indication of electrical power output from one solar array, would lead us to believe that one wing may be a little bit deployed, one wing may still be completely retracted and not functioning, one wing could conceivably be gone. And these are all speculations we don't know the answer to at this point.

QUERY If I've got the note correctly, and if I haven't, please correct me, you said, I think, earlier that you might dock before trying any EVA procedure. If you did dock, would you have a look inside MDA and ATM and perhaps try to vent the OWS before you go on with any of your EVA procedures?

DISHER Okay. That could be either way. If we had concluded, on first look, that it was feasible to attempt the external deploy, and then we went on to dock for rest purposes, we would not expect to enter, but we would expect to undock and go do the external EVA. On the other hand, if we had first docked because we concluded the CSM deploy was not feasible, then we would first enter the workshop.

QUERY Do you have any kind of photographs at all of the spaceship, and if so, what kind of a resolution in the photograph do you have?

DISHER I have no photographs. I did have a report last evening from an astronomer in the Houston area who, with his own telescope, stated he saw the ATM crosswings

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deployed very clearly. He did not see any protruberance from the workshop tank itself.

QUERY Have you made any yards yet in your investigation as to what caused the shield to deploy prematurely?

DISHER That - that examination is going on in an intensive manner at the Marshall Center as well as here at Houston. I have no factual information that I could discuss at this point. We've been concentrating our efforts, from a management standpoint, on resuming the mission in an alternate mode, but examinations are going on. As soon as we've reached conclusions that we're reasonably satisfied with, we'll certainly have something to say on that.

QUERY John Donelley said yesterday that NASA had received photographs from the DOD of the spacecraft, and that's all he would say. He was saying that NASA had agreed not to say any more. Do you say that you haven't seen those photographs that NASA received?

DISHER That's correct. I have not. I said I have not, in case that was not heard.

SPEAKER Okay, we'll take some more questions here. Ed DeLong and Jim.

QUERY What are the possibilities that part or all -

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QUERY What are the possibilities that part or all of the meteoroid shield might be hanging from the spacecraft, draped around part of it, something like that?

DISHER We're quite certain that there is no meteoroid shield there. And the basis for that is the temperature distribution around the surface.

QUERY It's even enough, that say, a portion of it might not be sticking out, you know, where it was ripped free but there's still some debris, major debris hanging there?

DISHER I guess that's conceivable and if we talk about jagged edges or relatively small pieces, that certainly is possible. That's one of the things that Pete would be looking for right away. I say, our data would indicate no major area attached.

PAO Jim.

QUERY Have you had these DOD pictures described to you, if so, what did they indicate?

DISHER I'm not going to comment on that, thank you.

PAO Steve.

QUERY Another one on the subject of those pictures. We understand that, because they involve classified cameras we can't be provided with those photographs even in a changed format. Can you explain that restriction?

DISHER No, I really can't I'm not prepared to comment further on that subject.

PAO Okay. Do we have any more questions. Bill.

QUERY The long lens they're carrying, is that for the television camera, for an engineering evaluation, or is that for the still camera?

DISHER Still camera, for damaged photographs. Right. The TV camera does have a zoom capability to some degree already.

QUERY In listing the additional items that would be carried up by the CM, you did not mention either food or medicine. Yesterday, we were told there was a possibility that at least 50 percent of the medicines were damaged and in very specific categories. What's the new status on that and on the food disc?

DISHER Okay. On the medication, I first heard that comment this morning that there could be some effect on the stored medication. As of this morning, none of us in the program area were aware of any damage. We are going to get a report from our medical people to determine if that, in fact, were case there could be a need to send up selected medications. But I'm just not aware of any damage that has happened as of the moment. The food; about 10 percent of the food could have been damaged or could be damaged before we get there, based on estimates that the food could have been exposed to temperatures of the order of 110 degrees for 10 days. There is about 10 percent of the food - canned food that could have been affected by that. And we will probably need to make the assumption that that 10 percent of the food has been damaged and not use it. The frozen food remains in - the freezer temperatures are down and there's no problem with it. The remaining 80 percent of the food or so would not be affected by the higher than spec temperatures.

QUERY You say, not use the food, what about replacing it?

DISHER We would not in the first mission at least, plan to replace it. There's the full 5-months of food, plus some reserve is there and we would not plan to take up any additional on the first.

QUERY Does that cause problems for any of the diets that any of the 3 Skylab 2 crewmen had picked out?

DISHER Problems in what regard?

QUERY Specific foods that they might have requested onboard.

DISHER Oh, okay. I guess it might create a little inconvenience for personal taste. The medical evaluation will have to consider the fact that they're not eating that 10 percent of the food. But, the main fact - the main point medically is to know specifically what foods they are eating.

QUERY How are they going to know that this food isn't edible? Are they going on the basis of probability from the ground, or will the men be looking at it or smelling it, or whatever?

DISHER Okay. So far, when we said that 10 percent of the food could have been affected, that's based on literature search in past history of particular canned foods. And we made the conservative estimate that up to 10 percent could have been damaged by this high temperature exposure for 10 days. We right away set into motion tests on the ground and if those tests verify our early assumptions, then we would simply not use that food. If on the other hand, the ground tests verify that we were overly conservative in our assumptions then that food would be available. But, the particular food products which are in question here are generally those that contain meat, are primarily meat - meat products. Yes.

QUERY I'm a little confused about this blanket of secrecy you're putting over these pictures.

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DISHER No, I'm just saying I don't know, that's all.

QUERY They have been described to you?

DISHER I said I'm not going to comment on it any further. That's all. Okay.

QUERY Why won't you comment on it.

DISHER Because I don't happen to be in that loop, that's all.

SPEAKER Our position is, Berry. We've acknowledged that we've got the pictures. We are not at liberty to distribute the picture or to interpret it. And that's our position.

QUERY Or to say, that anyone has seen it?

DISHER I don't know of anybody that's seen it.

PAO We'll switch to the Cape for one last question there and then we'll come back for one here.

QUERY Will anything have to be - that has already stowed on the command should have to be taken off to accommodate this new material? And secondly, what essential problems do you anticipate trying to get this stuff filled since everything was all ready to go last week?

DISHER Okay. Yes there will have to be selected items removed. We're currently looking at that along with looking at the additional items that we think we have to put in. We're looking at the items that may have to come off to make way. And that, the stowage factor, was another item in consideration of the schedule.

PAO Okay. One last question here and then we'll wind it up.

QUERY What time will (garble)?

DISHER 9:02 a.m. - -

SPEAKER No, no.

QUERY (Garble)

DISHER I'm sorry I didn't understand that.

QUERY I think she wants to know how long it will take to prepare the sunshade - to fabricate the sun shade.

DISHER Oh, Okay. Yes. I think we will have hardware by Friday. What's today, Wednesday? Is today Thursday? Okay. We will have prototype hardware tomorrow. That prototype hardware could be suitable for flight. On the other hand our test might indicate we need to make changes in it. So, our assessment, allowing for changes, is that we would have hardware by about Wednesday or Thursday of next week, that could be loaded onboard the spacecraft.

PAO Thank you very much.

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SKYLAB NEWS CENTER
Johnson Space Center

SKYLAB STATUS BRIEFING
Johnson Space Center
May 17, 1973
9:00 A.M. CDT

PARTICIPANTS:

George B. Hardy, Skylab Program Office, MSFC
Terry White, Public Affairs Office

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PAO We'll start over again now. We have this morning Mr. George Hardy. He's director of Systems Engineering and Integration at the NASA Marshall Space Flight Center in Huntsville, Alabama, who has been involved in the off-line planning for some of the hardware under consideration for crew of Skylab 2. Mr. Hardy why don't you go over some of the stuff that's been covered on the last shift here.

HARDY First of all I'd like to talk about the status that we're in right now, what's occurred over the past 12 hours or so, with respect to the health and well-being of the Skylab that's in orbit. We have been as you're probably aware, for some time now working to maintain a reduced temperature in the orbital workshop. Without the micrometeoroid shield, which was also a thermal shield, the temperatures in the orbital workshop tend to go up higher than anticipated and higher than desired. And we have been looking and orienting the vehicle, the spacecraft and various attitudes, which would tend to take the direct solar incidence away from those spots that would increase the temperature inside the workshop. We have been quite successful with this. We orient the attitude of the vehicle slightly off the sun line. The side of the workshop would normally be directly on the sun line, what we call the solar inertial mode and we have oriented the vehicle in such a way that the side of the orbital workshop is not directly on the sun line. That reduces the solar incidence and the temperature rise in the workshop. We've been able to do that quite successfully. We would expect to continue that until such time as the workshop is manned. The attitude pointing control systems that we use to stabilize the attitude and to point us off the sun line are performing very well. The power system from the ATM that is deployed and active and operating properly, is working very well. The communications telemetry systems command systems are performing satisfactorily. So, we are maintaining a stabilization of the systems and the Skylab in orbit quite successfully and this will continue in this matter on until we, in fact, man the spacecraft. That's what the on-console Flight Directors have busied themselves with for the past 12 hours and will continue to do essentially in this same mode. As far as the conditions we need to get into to man the vehicle, I mentioned the temperatures in the orbital workshop are considerably higher than anticipated because of the absence of the micrometeoroid shield and I believe Mr. Schneider and others have made some briefings in the last 24 hours or so with respect to studies that are underway, activities that are underway, to develop a solar shield or a solar curtain, if you will. They could be deployed when the crew gets to the Skylab, which will, in effect form a big shade or unbrella over the solar side, the sun side of the Skylab. And we would anticipate then, that this would fulfill the role of - the thermal role of the micrometeoroid shield in reducing the temperatures sufficiently that we could then, in fact, maintain the orbital workshop habitable. Are there any questions?

PAO Wait for the mike, Bruce Hicks, front row.

QUERY Mr. Hardy, first of all do you happen to know the - what the degree angle is on the attitude of the spacecraft at this time and what it has been overnight?

HARDY Yes. As I mentioned, normally we are - the normal attitude is solar inertial and the - that is in the long axis of the Skylab or the orbital workshop, is 90 degrees to the sun line. We have been maneuvering that axis out of the sun line by between 40 and 50 degrees. We've been changing that incident angle then, between 40 and 50 degrees and right now we're at 50 degrees and will be holding from time to time into the solar inertial attitude to update our attitude for the control system and certain things like that, but then we would return back to this more favorable attitude from a thermal standpoint.

QUERY Under one of the proposed fixes for the thermal problem, the one being studied the most here at this site, anyway, the flyaround fix of deploying a covering, is Pete Conrad doing most of the simulating on that and working with that as far as from his incidence standpoint?

HARDY Yes, Pete Conrad is very active in that activity.

QUERY Would you then expect Pete, if that proposal is accepted to be the one - the astronaut - the crew member to use that method? And at the same time, since Joe Kerwin is in Huntsville working on the other most likely fix of the curtain, that he would be the one to deploy that if it is chosen?

HARDY To take the second question first. You may have more update information than I have on that, but I believe Rusty Schweickart is in Huntsville working with them there. I could be wrong, but I believe Rusty is there. They are, by the way, at Huntsville working in the water emersion facility, which is a big water tank, in which they can actually simulate, through neutral bouyancy, the zero-g effect. Pete, as I said, is very much involved here in the flyaround approaches and certainly would as commander be in charge of that activity, as well as all the other activities.

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PAO Peter Mosley.

QUERY How confident are you, if necessary, this stabilization could be maintained, let's say, until a week tomorrow?

HARDY Well, I would say that since getting through the night, most of yesterday and through the night in that attitude, I emphasize again, we've changed the excursion angle slightly from time to time. And we would expect certainly, to go back into solar inertial attitude from time to time. But, with the experience that we have had over the last 15 or 18 hours, I think we feel very confident.

PAO Roy Neil.

QUERY I have two questions. First, when do you think some decisions will be made on which system will be used? When do think that the launch date will be locked in? And secondly, can you give us some idea of what systems onboard might be degraded, and what equipment might be damaged by the higher than designed temperatures?

HARDY As far as a selection of a type of solar shade and the deployment scheme for that solar shade, we're working at least 2 primary modes to get essentially with the same vigor. And it is quite possible, although this has not been decided, but it is quite possible that 2 options will be carried all the way to orbit. And, decisions made by the commander in consultation with the ground on which option to be used and then of course, the alternative is available then to use the other option if that one doesn't happen to work. That is quite possible that will be done. The decision has not been made on that, but - I am not prevy to the information as to exactly when the decisions would be made on launch date. We are pressing forth with all of our efforts to launch as early as possible. It would be my opinion that such decisions will be made within the next 24 to 36 hours. The other question about systems degrading. Our concern with our - our primary concerns with temperatures in excess of that which we had expected, and of course, you would understand that in all cases we predict the temperatures we're going to have and then we design for higher temperatures, because one's predictions are not always correct even if he's in a near nominal mission, which, of course, we're not quite that well off right now. The systems are - the food, and as you well know, we have the various types of food. We have frozen food which I might mention, is being taken care of very well by an active - -

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HARDY As you well know, we have various types of foods, but we have frozen foods which I might mention as being taken care of very well by an active refrigeration system on board the orbital workshop that is performing right up to standard. And the nonfrozen foods - We are getting our temperatures down and, in fact, have had our temperatures down for some time into a regime which would indicate at this point in time that we have no serious or major problems in that area right now. But we're obviously watching it, and that's one of the prime reasons to get the temperature down. We have film stored aboard, and we can take elevated temperatures in the film for certain periods of time, and this is in terms of days, by the way. One goes into weeks and months; then he's going to have to resupply the film. Of course we have some resupply capabilities, you know, with the command service module. We're not in a temperature regime that we have any major worries with respect to electronic components and things of that nature; so it's primarily the two items that I mentioned there, that most everything we've got in there just likes it better if you don't get too hot. But we're not in danger of melting our electronic components or anything of that nature.

QUERY What was the highest average gas temperature you had inside the spacecraft, and when was that, and what is the average temperature now?

HARDY All right. First of all, we have a number of temperature sensors external to the spacecraft. I might mention, and you probably know this, that the temperature in the other rooms of the Skylab house are quite satisfactory and are in the regime that we would expect them to be. The orbital workshop is closed off with the hatch that separates it, at this time at least, from the airlock module and the multiple docking adapter. So the temperature in the other rooms are in very good shape. The - We have many sensors and we have sensors outside on the skin of the orbital workshop, and we have sensors underneath the insulation. And then we have sensors inside. Some of the sensors inside tend - all of the sensors inside have to be integrated in such a way to give you what we call an average mean temperature. They measure - they're mounted on structure; so they measure structural temperatures. The structural temperatures are not directly translated, of course, into gas temperatures. We had seen temperatures initially, before we started doing attitude changes and excursions in the workshop, which was, in fact, what told us we were going to have to get out of that attitude which could be averaged out to give you something in the neighborhood of 110 degrees, 115 degrees. We had some that emphasize. We had some sensors, however, that go off scale at 120 degrees and some of them went off scale at 120 degrees.

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But if you take an integrated average, you could come to that estimate, and we felt that we were going to go higher than that if we'd stayed - something higher than that, don't know how much, if we'd stayed in that attitude. We now through the attitude excursions that I've mentioned, have been able to bring those temperatures down to - averaging between, again this is a total mean average, between 90 and 105 degrees. So we've been able to get that down 10 or 15 degrees, in some locations even better than that. I might mention that the other side - the antisolar side of the orbital workshop is helping us quite a bit because it's colder than we'd expected.

QUERY That 90 to 105 degrees is considerably lower than what Mr. Schneider said yesterday of 109, I believe 0.5 degrees.

HARDY 100 and what?

QUERY 109.5 I believe is what he gave.

HARDY Slightly lower.

QUERY And did this drop over night? Is this -

HARDY Temperature has dropped over night.

QUERY From 109.5, or thereabouts, to 90 to 105 range?

HARDY That is correct. Temperature has dropped over night in the extended off-nominal attitude that we've been in. Prior to that time, we had gone into - out of solar inertial and into some off-nominal attitudes, but we had done it for short excursions. We have been in, I believe, since about rev 131 or thereabout, and we're in 141, 142 right now; so we have been in - since we've been in that, the temperatures have, in fact, dropped. They're showing still some tendency - We can't tell right now whether they're stabilizing there now or still some tendency to drop a little bit further.

QUERY If you don't launch on Sunday, can you - is there a possibility that you might face a sudden deterioration inside the station?

HARDY I don't quite understand. What nature?

QUERY Well, I was wondering - You're confident that Skylab is fully stabilized. So as long as you'd like to wait for the launch, is that right?

HARDY Yes, that's correct. That's, of course, within reason. I think we would like to - we would like to get up and do the deployment of a solar shade as early as possible, but we want to make sure that when we do that, that we have the proper training, the proper equipment to do that with. And as of now, there is no systems that are being extended beyond their capabilities to maintain this attitude or this environment. And we're not in any danger of expending expendables and things of that nature.

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QUERY I'd like to pursue that please, Mr. Hardy. When you talk about you're confident that you can hold everything until you get the astronauts up there, are you talking about a 5-day slip or breaking quarantine and waiting 20 days or 30 days or what?

HARDY I mentioned earlier that I would expect that, based on the work that we have going now and the progress of defining and building solar shades, that within the next 24, 36, 48 hours, something in that time frame, we will have a very good prediction and schedule on a launch date. I would not anticipate that we're talking about anything that approaches 20 days.

QUERY The reason I'm asking is that, maybe I better put it this way. May 25th may not necessarily be the firm alternative to this Sunday. Do I understand you correctly?

HARDY I'm sorry, you broke up right at the end.

QUERY I'm just trying to rephrase it to make sure I understand you correctly. From what I gather, May 25th, the 5-day slip, may not necessarily be the alternative to this Sunday. Do I understand right?

HARDY That is correct. And I might add that it may not be that long.

QUERY I thought you had to go in 5-day cycles and the 25th is the next 5-day cycle, but you don't necessarily have to wait only 5 days; you might want - prefer to wait 20 days and add a couple of extra days to that because you've got them for this weekend.

HARDY Well, 5-day cycles give you an optimization for rendezvous and things of that nature, but there is no overriding, undoable thing that would keep you from going in less than 5 day cycles.

QUERY You mentioned the possibility that you might take two options all the way into orbit. Is it safe to assume that that would be the two options which both include the thermal shield but different kinds of EVAs?

HARDY That is correct. That is, at least, the status at this time. And I think that's rather firm.

QUERY GARBLE GARBLE from the Huntsville Times. Since it is possible that the station was jarred somewhat when the thermal shield malfunctioned after launch, do you know for certain that the hatch for the MDA, for example, was not damaged, or any other mechanical system? And number two, what kind of debris do you have around the bird right now?

HARDY With respect to the hatch and the structural integrity of the vehicle, we are maintaining pressure in the MDA and in the orbital workshop quite satisfactory.

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One of the first things, of course, the crew would do when they get into orbit would be a -

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HARDY - one of the first things, of course, the crew would do when they get into orbit would be an inspection. And I think that it will be from that inspection that we get, obviously, our best estimate of the structural damage that may exist, or the debris that may be around the spacecraft itself.

QUERY When that inspection is made, will you have the TV operating so that you can follow it on the ground?

HARDY That timeline and flight plan for that activity is in process right now, and I'm not intimately familiar enough with the details to comment.

WHITE No further questions from the Cape? Roy Neal.

QUERY Mr. Hardy, can you describe for us the kind of hardware with the two systems that you're talking of, what kind of hardware are you looking at as a thermal shield fix.

HARDY I prefer not to get in the details of that for this reason. To work in a condition like this, the flight control teams and the supporting elements go into what we call on console and off-console teams, and I've just come from the on-console team. The on-console team is tasked primarily with the job of keeping the show going, keeping the Saturn workshop operating and active and attending to any of its needs. The off-console team, then, is in the backrooms and in the conference rooms, and in the other facilities working on the things to be done when the crew gets there, and there are a large number of people here at the Johnson Center and at Marshall working on the design details of that. I know they have several concepts in mind, several materials in mind. Basically it would be a fabric base type material with some sort of aluminized surfaces properly coated or properly painted to achieve the thermal characteristics they are looking for. So one can think of it as a large awning or a large shade, or something of that nature, attached - rigidly attached at the base of the orbital workshop and somewhere up forward.

WHITE I have three questions here phoned in by Bill Heinz. One, what are the dimensions of the solar shield, and when would they be stowed in the command module and deployed? Two, where would it be carried in the command module? Three, would other materials have to be replaced?

HARDY I guess the comment I just made about the details of the design would apply here. I'm not presently - I was in the conceptual phase, but not presently in the details. And I might mention this - these shields are in detail design, but I'm not in that right now so I cannot tell you. But basically I think one can speculate rather accurately because of the concept that we're trying to acheive here that this shield would be something in the vicinity of 30 or possibly 40 feet long and 10 to 15 feet wide, or something of that nature. The stowage in the command module, of course, is the prime responsibility of the Johnson Center here, but the capability would exist quite late in the count at KSC to stow equipment of this type in the command module. Now I say quite late, I mean up to the day or possibly even the evening before a launch; that is with all of the designed details having been developed earlier. Where it will be located, I'm not familiar with the stowage location that is being addressed, that is being looked at. When deployed will depend on the scheme used, and as I mentioned earlier, to some extent or to a large extent, in fact, that could depend upon the condition which exists as viewed and assessed directly by the commander after he gets into orbit. We do not at this time contemplate any replacement of basic systems or hardware in Skylab. There may be a desire or a need to replace some film and possibly some food, but this does not look to be - at this time to be a massive quantity or a substantial amount of replacement.

WHITE Any further questions here in Houston? There is one back there.

QUERY At this point, sir, are you far enough along to tell us what point in the Skylab 2 timeline you'll get to that EVA.

HARDY Well, I guess the - as I mentioned, it depends upon the deployment scheme, the hardware development over the next few days, the deployment scheme that would be chosen, and as I mentioned, it is possible that that deployment scheme may not be chosen until in fact we get on orbit. And it could be done as early as the first day; it could be done possibly as late as the second or third day. But there will be flexibility and options in this ragard.

WHITE It appears we have one more question from the Cape.

QUERY Mr. Hardy, has a determination been made yet on the cause of the failure of the shield?

HARDY I'm not active at this time. It is obviously being assessed. Data is being evaluated from prelaunch through the launch phase itself. It is actively under investigation, and I'm not directly involved in it so I just can't comment any more than that.

WHITE Another one from the Cape.

QUERY Mr. Hardy, can you just pursue for us a minute, please, that EVA timeline you just mentioned that could be done first day, second, or third day. There are lots of

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options in this ragard, do the options include a night launch?

HARDY That - I'm not aware if that option is being looked at, but it may be and I'm just not aware of it.

QUERY If the EVA was delayed for the second or third day, would this imply docking first and then half time docking again?

HARDY That is a possibility, that is part of the flexibility that I just mentioned to you. A delay would imply, and by delay, I mean the second or third day, would imply a deployment that required first entry into the multiple docking adapter in the airlock module, and then either EVA from there or back into the CSM undock and EVA from there. There appears to be a lot of options to us; there appears to be a lot of flexibility that we can carry all the way into orbit; and there appears to be opportunity to exercise those options after we get there.

WHITE One last question from Roy Neal.

QUERY Mr. Hardy, based on everything that you know, what is your personal feeling about a launch date. When do you really think it's realistic to go?

HARDY I think that we will know better how to answer that question in about the next 18 to 24 hours.

WHITE Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Johnson Spacecraft Center

CHANGE OF SHIFT BRIEFING
Johnson Spacecraft Center
May 16, 1973
8:20 p.m. CDT

PARTICIPANTS:

Don Puddy
E. D. Williams

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Time: 2017 CDT
5/16/73

PAO Good evening. Tonight we have a Flight Director, he's just come off, Don Puddy, and he'd be happy to answer your questions. I think he'd like to give you a brief status report first. Don --

PUDDY Okay, let me say, to start off with, that last night I indicated to you what our primary action items were, so let me start off tonight by saying that our primary action item today was to get a real good handle on the thermal control systems. And basically, as you were well aware of last night, we were - when I was over here talking to you, we were in a solar inertial attitude and going at - planning to stay in that attitude, and we were investigating through various areas, some of the options that might be available to us from a thermal standpoint. That conference broke up shortly after I was over here with you last evening, and basically, the decision was made - that it was going to be necessary to perform some type of maneuver in order to decrease the increasing trend that we were experiencing in the habitation area temperatures. During the nighttime frame, which may have been reported to you this morning, we tried a mechanism where we were essentially working an alternate solar enertial rev with a ZLV rev. We looked at that and although that was doing us some good, we expected that we would probably stabilize out with temperatures in the habitation area somewhere around the 120 to 130 degree region. It looked liked it had some drawbacks as far as the refrigeration system was concerned. We might get a little bit higher in the food temperatures there than we would like to be. We weren't in any serious danger, but we are going to get a little bit higher than we would like to have been. And also, it looked like it wasn't going to get quite as low in the habitation area as we felt that we might be able to. So, when I came on shift this morning, we kicked it around for awhile and we elected to go ahead and try a pitch up maneuver of 45 degrees. And while we were doing this, while we were thinking about this, our primary intent was to make sure that we understood just exactly what effect this was going to have on the thermal system, what effect it was going to have as far as electrical power considerations, because of course, we were moving our solar arrays away from the solar enertial attitude, so we were not getting a full charge rate, and just exactly what effect it would have on the attitude control system. We felt like that we would start out at 45 degrees, because this was lower than we thought we might be able to go, and yet we felt that we would be able to get a pretty good idea of the trend, thermal wise, that we might be - expect, - by using this type of maneuver. We tried this for a couple of revs, and it did indeed show that we were going to decrease the average

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temperatures, now this doesn't mean that we were going to take all of the temperatures down, some temperatures , of course, are going to increase because you're showing different areas of the vehicle to the Sun. It also looked like at that particular attitude, that we were going to be able to maintain energy balance using the ATM solar array system. So, we decided to go ahead and try 50 degrees. We were able again, to show more improvement, thermal-wise, and were still able to maintain energy balance. We were, however, running into some small problems in the attitude control area, and we did use a little bit of TACS gas, because we had a small offset - -

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PUDDY - Running into some small problems in the attitude control area, and we did use a little bit of TACS gas because we had a small offset along the the Z or the yaw axis of the vehicle. We compensated for that particular offset, which squared away our attitude control system, and after looking at that for awhile, felt like we might be able to stretch that to five more degrees. So we presently are - at this time are pitched up 55 degrees, and I think that if we are able to maintain an attitude somewhere in the 50 to 55 degree pitch-up region, we feel like we can probably stabilize out somewhere, as far as average gas temperature into the 100 to 110 degree area. I think this is probably, unless some new significant data comes forth, which is entirely possible, I think this is a good temperature. It's one that we can live with until we do get a crew there, and I think this is about the best that we can do. There may be some combination, because we are experienceing now some elevated temperatures in some of the ATM component areas, there may be some reason to alternate this particular maneuver with the one that we tried before, which was a combination solar inertial-Z local vertical. So there is still some work being done on it. We don't expect these temperatures to completely stabilize, and thus to have all the data necessary to have a real good feel for a complete thermal model for at least 24 to 48 hours. But, I think we've made a lot of progress since I talked with you last night, and are homing in on a definite solution. So that was the - I believe that was the main action item that we were working on today. We have had no other vehicle problems of any type that have occurred today. You may have heard some discussion about several items that we have taken off line from the standpoint of power. This is certainly not because we're worried about generating power. This was strictly to go ahead and enable us to take this extra 5 degree pitch-up to 55 degrees and still maintain a complete energy balance, and when I say energy balance, what I mean is everything we take out of the batteries during the night side, we replace during the daylight portion of the orbit. So that's the main action item there and at this time, let me open it up and see if you have any questions.

QUERY In the present configuration, what kind of average electrical power are we talking about from the ATM?

PUDDY I think right now our mode is running somewhere around 26-2800 watts.

QUERY How close is the Sun, is 65 degrees? Is the Sun 90 degrees? Is that your reference point?

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PUDDY Well normally when we're talking about solar inertial, what you're generally talking about is direct impingement of the Sun on the solar arrays. So what we're talking about is that the vehicle is pitched up, and of course your Sun is still coming down, and it's impinging at essentially the cosign of the angle.

QUERY A temperature of 109 degrees was mentioned this afternoon for the habitation area and just recently, we heard that it went down. What is the latest figure? What's the latest temperature on the habitation area now?

PUDDY It's - Because of the number of temperature transducers that are located throughout the habitation area, it's very hard to quote it unless you start quoting it in a particular segment of the vehicle. I think the 109 degree temperature that was mentioned this afternoon was an average, which I had also tried to speak in terms of. We are now around that figure - 109-110 degrees. We feel like we are still on -

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PUDDY - in terms of - we are now around that figure, 109, 110 degrees. We feel like we are still on a decreasing trend and may get down as low as 100 degrees. Be advised that when you're - you know last night I told you that the tempara- tures on the plus-Z side of the vehicle were running some- where on the order of greater than 295 degrees, in other words, we were off scale high. Most of those temperatures, now have come on scale, and so we're starting to read figures that are - say, 40 to 50, sometimes 60 to 70 degrees, lower than what I was discussing last night. Some of the temperatures, on the other hand, on the minus-Z side of the vehicle which I re- ported you last night were running in the 70 to 90 degree region, are now running 90 to 100 degrees. They are picking up some Sun, but the overall average is decreasing and stabiliz- ing. And last night they were still rising.

QUERY Can you see how much they've decreased? When you say they are decreasing, have they gone from 109 to 107 in the average?

PUDDY Let's see if I can quote you some good figures here. I would say that, in general, on the plus Z side of the vehicle, we can probably say that we have dropped anywhere, and I'm going to speak to you again over a band, of somewhere between 50 and 100 degrees drop on some of those on the plus Z side. We have gone up, in general, say 5 to 25 degrees 180 degrees from there, or on the minus Z side. Last night I was talking to you in the order of 140 degrees on the 90 degree positions, and we're now talking of those temperatures being around 100 to 110, so we have decreased those some, generally 25 to 30 degrees. Now, these are all exterior structural temps, and you do, of course, have a thermal lag before all of this is reflected in the gas temp- erature, or the crew habitation area. And that's the reason I mentioned to you that there is going to be some time before you actually see the complete effect of that on the gas temp- eratures.

QUERY The average gas temperature's roughly the same in the habitation area?

PUDDY The average gas temperature right now is roughly the same, and we're - I would expect that we're cer- tainly not going to go any higher, and we may decrease.

QUERY Don, the thought occurred to me, that, okay, we get a crew up there and we decrease the - we've de- creased the gas temperatures a lot, but we still have some structure temperatures, and some of the gridwork temperatures, and so forth, that are higher than the gas temperatures, as I understand it. What happens if you get a crewman in there who doesn't, say, doesn't have a glove on because it's pressurized, he's got good atmosphere and everything else and he grabs hold of the hot metal? How hot is that going to be? Is that going to be a problem or is it of any concern at all?

PUDDY Oh, I think it's certainly of some concern, strictly from the standpoint that we need to look at that. The crew, of course, will be thoroughly briefed as to just exactly where those thermal hot spots can be. In general, I think what you are going to find is that thermal hot spots are going to be where you have got a large structural piece that goes completely around the periphery of the vehicle. We had to find what we consider to be the crew touch temperatures, and it's one of these things where, you know, just like a hot oven, if you're not sure, you touch it gingerly first.

QUERY You say, you have defined them, or will have to?

PUDDY These are being worked. Most of them have been defined. Generally, you're talking in the order of 120 to 150 degrees as viable touch temperatures.

QUERY At that temperature, or above that temperature, it's either going to hurt a little bit, or it's going to hurt a lot? You know, I mean, what does the touch temperature mean?

PUDDY Well, when you start talking about 150 degrees, it's certainly not something that you want to hold on to very long.

QUERY Okay, also, I gather from your general optimism that you don't worry at all about keeping the vehicle stabilized thermally until we can get a crew there.

PUDDY No, I'm very confident , now that we have enough of a handle on all three areas that are our primary concern while we run this vehicle unmanned. That's the attitude control system, the thermal system, and the electrical power system. And each day we're gaining a little more experience with this vehicle, and I think right now, I'd have to say that I, personally, am very confident that we can manage that vehicle until we get a crew there.

QUERY I got one more yet. This is by far the longest unmanned launch of this size of a vehicle, as I understand it. What kind of experiences have you found so far with that massive piece of equipment?

QUERY From a flight controller's point of view? I mean, you know, you haven't got a crew up there to help you out at all? What - -

PUDDY Well, I don't know exactly how to answer that question. Anytime you launch a new spacecraft, you have

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a given set of data, which the various contractors and vendors have provided, which gives you an idea of what they project. Certain things are going to be in terms of pressures, or temperatures, things of this nature. In some areas, we've found these to be very accurate, in other areas we've found these things to be significantly outside the ball park. Certainly, a lot of this can be attributed to the fact, at least in the thermal aspect, that we don't have a meteoroid shield. There is always a learning curve associated with the launch of each new vehicle. As far as - and I think we're gathering the data just like we did during Gemini and Apollo. And I'm sure we will on the Shuttle. I think that as far as running it unmanned, as you all are very well aware, we expected to have a considerable unmanned interval between Skylab 1 and 2, or between Skylab 2 and 3, I should say, and Skylab 3 and 4. So, we weren't totally unprepared to cope with the unmanned operations. And we're finding it interesting, and anxiously awaiting through the crew's arrival.

PAO One more question here, and then we'll go to the Cape.

QUERY It's a quick question. What kind of a power area are we talking about for a sort of a minimum housekeeping in the laboratory? How much power does that take?

PUDDY Let's see if I can remember those figures. I think we were talking about essentially being able to generate somewhere around, and correct me if I'm wrong, Kiss Doug, you may have a better figure than I do - 4400 watts was what we thought we would have available considering we could generate from the ATM and also the CSM, and this would leave us a surplus of approximately 5 to 600 watts for experiment usage.

PAO Okay, Cape Kennedy?

QUERY Jim Sorrell, Pacifica Broadcasting. Don, will you have in the orbiting workshop enough TACS gas for attitude control to complete a three mission, 8 month flight program based on consumption so far, and planned consumption before crew habitation?

PUDDY Yes, I feel fairly certain that that will be no problem whatsoever. I'm sure some of you have heard some concern, or experienced some concern, over the fact that we are below what we projected to be at this particular time. Right now we have about 78.3 percent of our TACS consumable left. This is some 12.2 percent below what we expect it to be at this particular point in time. However, we're still some 44 percent above what we call our experiment red line, and that experiment red line is based on the fact of operating all of the experiments for all three Skylab manned missions - -

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PUDDY - based on the fact of operating all of the experiments for all three Skylab manned missions, which do require TACS consumables, so we still feel that we're very healthy in that area. As I mentioned earlior, we did have a problem with this morning with an offset in Z, which was causing some use of TACS gas. Since we have compensated for that during the last 5 hours, we have not used any TACS gas at all, and I feel fairly certain that we'll be able to keep a good handle on that. We probably certainly will use some additional consumables in this area prior to crew arival, but I certainly do not think that we'll get anywhere near our experiment redline.

QUERY Don, can you give the average inside temperatures when your team left the console. I heard a report earlier, a couple of hours earlier, you were getting close to the hundred degree mark. Secondly, Mr Schneider said today, what I can describe as a BEF Solar Mode attitude, which the incoming team might try tonight. Is that still planned? And finally, what does opening the airlocks do, in your expectations? Balance out some of the heat problem, or make it worse?

PUDDY As far as the attitude maneuvers, I think we're still talking about running, at least for the next two or three revs, trying to maintain the 55 degree pitch up attitude that I mentioned, in order to get us a real good baseline as to just exactly what that attitude does provide. Running something like this for one or two revs, you can begin to pick up a trend, but it's not one that you would want to go ahead and say "I know that if I run three revs at 55 degrees, I'm going to have this effect on temperatures in the various areas." So, I'm certain that we're going to go ahead and try that for at least a couple of additional revs. We may drop back to 50 degrees, because of small increases in temperatures in the ATM area, later this evening, and we may also as time progresses decide to get into an alternate between a pitched up attitude profile, and running the one that occurred last night, which was the combination of solar inertial and ZLV. What was the other part of your question?

QUERY You're not going to try pointing the blunt end at the sun then. That's what Mr. Schneider suggested today at a briefing, while you were working.

PUDDY Pointing the radiator shield, essentially? The refrigation system radiator at the Sun? To the best of my knowledge that particular mode has not - is not being worked seriously at this particular point in time. Mr. Schneider may be privileged to some information I'm not, but

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I think one thing that we would certainly be very cautious about if we ever did get into that type of attitude profile is in exceeding that the head rejection capability that we have from the refrigeration system, and therefore possibly running into the possibility of damaging the frozen food. So I do not believe we will be getting into that attitude control mode as far as maintaining thermal balance.

QUERY Okay. The final part of my question was, what's your expectation when you open the airlocks? Does it help give you some heat balance, or does it make the situation worse?

PUDDY I think that's all dependent on just exactly whether or not you go ahead and actually start gas mixing. I have not been on the off - console team as far as just exactly how they plan to work the activation check list right now. I think it's probably going to progress fairly nominal. If you get into gas mixing, certainly, as far as a gas temperature itself is concerned, when you start mixing a little cooler temperature that is in the MDA AM, with the habitation area, you're going to experience some decrease in the gas temperature. I don't think that decrease is going to be tremendously significant, just because of the relative volumes involved. You know you're talking about a very large volume of gas in the habitation area, and not nearly that volume in the AM MDA. But if you circulate it, it certainly is going to help to some degree.

QUERY With the temperatures in the spacecraft apparently stabilizing near something that you can live with, is the launch of the Astronauts now so time critical, or can you go for another five days after Sunday, another 10 days, or are their any pacing items?

PUDDY I think that we have the capability to be able to run in the mode that we're in right now, assuming that there are no additional spacecraft failures, and we certainly don't anticipate any, for as long as is required to get a crew in orbit and get them up there. No problem whatsoever.

QUERY If they don't launch Sunday, you can go another 5 days, or even 10 days after that?

PUDDY I think there would be no problem if we have to wait another 5 or 10 days before we launch Skylab 2. I think we can manage the vehicle very well.

QUERY Earlier you made a reference to elevated temperatures in the ATM. Could you be a little more specific about that? And what kind of temperatures are you talking about?

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PUDDY Okay. When you pitch up, you essentially are exposing temperatures on the ATM canister to an environment that they're not normally expected to see. You'd get quite a bit of - You normally are impinging only on, what we call the Sun end of the ATM, and you also get quite a bit of shadowing from ATM solar arrays. We start pitching up, of course, we are exposing, essentially the plus-X, or the forward side of the ATM more to the Sun, and there are some temperatures there of say, associated with the CMG inverter assemblies, which are showing some increase in temperature. It's certainly not something that right now we're alarmed about. We're of course, watching the temperatures all over the entire spacecraft, and if these become, if these continue to show the same trend, we feel like that we can pitch down, say 5 degrees, and probably correct that situation without any additional effort on our part.

QUERY What kind of temperatures are you talking about?

PUDDY Component temperatures of the various ATM rack and spar mounted equipment. Not the ATM experiments themselves. These are things associated with the ATM attitude control system, primarily.

QUERY What kind of temperatures are you talking about in terms of - 150, 100, 90, 60, et cetera?

PUDDY I think you're talking in general temperatures there. Again the - that you would start getting concerned - greater than 100 degrees.

QUERY What are some of the temperatures you're talking about compared to what would be the normal temperature? You mentioned earlier - on elevated temperatures. What temperatures are you talking about in comparison with what would be the normal temperatures?

PUDDY If you're talking about increases of say 40, 50, 60, 70, degrees above what we normally would expect these temperatures to be running. Normally we're expecting these temperatures to be running in the 70 to 80 degree range. So we're talking temperatures, you know, up in the 100 to 150 area. We start experiencing some concern. We have not seen those particular temperatures increased to this point, and there's quite a bit of work going on right now as to just exactly what are the maximum thermal limits that we can experience in these areas, and still not have any definite concern, just like the last couple of days we have -

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PUDDY - that we can experience in these areas and still not have any definite concern. Just like the last couple of days, we have been working just exactly how high a temperature we can go in film vaults, and in the food storage areas, and things of this nature. So to quote you exact numbers of what are the cutoff limits, and where we're going to take action, I think right now would be premature. They are being looked at. There is no definite concern. It's just something that's being investigated, and we will take corrective action, once these firm limits are defined, to make sure that we don't exceed them.

QUERY You say there has been increases, 40, 60, 70 - increases of what? Increases from what, I mean, what is the basic norm? What are you talking about when you say increase of 40, 60 to 70? What is the norm?

PUDDY It is around 70 to 80 degrees. And so when I'm talking 40 to 60 to 70 degrees, I'm talking that we're somewhere in the order of 100 to 150 degrees. And you have to talk about a particular component, it's particular location, and it's particular criticality, as far as the maximum temperature it can be - that it can reach. And all of those limits are not now clearly defined. I certainly can get that data, and we'll provide it to the PAO people, as soon as it's been looked at and is available.

QUERY Do any of the data that you've looked at so far, be it voltages from the solar panels, or whatever, give you any indication exactly how much deployment of the two side solar panels you got? Just exactly how far along the procedure went before it jammed?

PUDDY No, I don't think we have any additional data over what I said last night. We certainly feel like we do have - wing 1 has lost a secured indication, so we know it has moved away from the vehicle a certain amount. We are able to get from a couple of the panels a certain amount of what I would choose to call a trickle charge into one of the AM batteries, but as far as in terms of deployment, it's very insignificant. It doesn't take much force, however, to pull this wing into position. I think it's a total force, assuming it wasn't constrained by the meteoroid shield or something of this nature, I think the total force required would only be a couple of pounds.

PAO Okay. Thank you very much. There will be another change of shift briefing in the morning, probably about an hour after the shift changes. It's expecting to break around seven, so, maybe somewhere around 8 o'clock in the morning. Thank you.

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SKYLAB NEWS CENTER
Huntsville, Alabama

Skylab 1 Status Report From Marshall Space Flight Center
Marshall Space Flight Center
May 16, 1973
4:20 p.m. CDT

PARTICIPANTS:

Leland F. Belew, Skylab Program Manager, MSFC
William C. Schneider, Skylab Program Director, Office of Manned Space Flight, NASA Headquarters
Bart Slattery, PAO, MSFC

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PAO As well as Washington, D.C. After the press conference is over for the photographers, if they wish to go to the neutral bouyancy simulator where simulations have not yet commenced, we will take you down there. I'd like to introduce, now, Mr. William C. Schneider, Director of Skylab Program in the Office of Manned Space Flight, and Leland S. Belew, Manager of the Skylab Program Office, Marshall Space Flight Center. Mr. Schneider.

SCHNEIDER First, I'd like to read the written anomaly report that I must take full responsibility for it being late. I have been promising that I would have it out by 2 o'clock, eastern daylight time, and. unfortunately, I was in meetings, up until just a few moments ago, updating the information in here and I thought it more important that you get accurate, updated information rather than giving it to you on a specific set time. So, I apologize again for the report being late. It was for a good cause, and the written report will be datafaxed, I understand, to the other centers. This is our daily anomaly status report. The flight of Skylab 1 continues in an increasingly stabalized mode and detailed reports will be continue to be issued from the Johnson Space Center. We, in this report, will be trying to confine our discussion to the anomaly investigation. The engineering evaluation has been continuing as a team effort with the Marshall Space Flight Center, the Johnson Space Flight Center, McDonnell, Douglas Aircraft Company, and Martin Marietta Denver; efforts proceeding on an intensive basis. Thermal analyses have been continuing and have included alternating Z-local vertical, that is, Earth oriented orbits and solar inertial orbits. This mode was tried out in flight and the internal temperature increase was slowed, but not stopped. Thermal analysis also included a solar inertial mode with the vehicle pitched with an angle of 55 degrees. This mode is currently being tested to see if the thermal electric problems can be solved. They look encouraging. Further orientations will probably be tried later in the day. Analyses have been conducted to survey the structural integrity of the workshop and its seals and windows, in light of the high temperatures. Initial indication is that the current thermal condition will not result in any structural problem, although the analyses of the scientific airlock seals has not yet been completed. The interior condition of the workshop is continuously being evaluated to ensure an understanding of the condition of the vehicle when it is manned. Currently, the food appears to be all right, although some of our film may have received excessive heat and be fogged. The condition of the insulation bonds and other interior items

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appear satisfactory, although some spot debonding may have occurred, possibly resulting in some blistering. No problem is anticipated. Activities continue at the Marshall Space Flight Center, Johnson Space Flight Center, Kennedy Center, Huntington Beach, Denver, and St. Louis to conceive of a scheme to perform extravehicular activities to provide a Sun shield and, thus, reduce the workshop temperature. Several approaches are being pursued and are being examined in the Marshall Space Flight Center water immersion facility, and at the Johnson Center. Members of the astronaut corps are participating in these activities. The concepts cover a wide range of ideas for providing thermal protection. Many options are considered open at this time, the three most promising appear to be a window shade-type deployment from the current EVA hatch in the airlock; and another very promising option is using standup extravehicular activities in the CSM and flying around the vehicle; and the third one that we are pursueing is the deployment of an umbrella-type device out of the scientific airlock. The activities at Kennedy Space Center are proceeding, presently, toward a launch of Skylab 2 on Sunday. A decision to launch will be made by Saturday afternoon. When a firm decision -

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SCHNEIDER presently toward a launch of Skylab 2 on Sunday. A decision to launch will be made by Saturday afternoon. When a firm decision is reached, it will be announced immediately. Thank you.

PAO All right, we will take questions. If you'll raise your hand, they'll bring a mike to you so that we get recording on the questions.

QUERY Mr. Schneider, what is the current readings, or the latest you have of the temperatures in the interior of the station, and the second part of that, if the temperatures continue to rise inside the station, is there good reason to be concerned about the possibility of fire or explosion before the station is manned, possibly from the cryogenics aboard, or whatever the case might be, sir?

SCHNEIDER I'll let Mr. Belew give you the details on this, but we are not worried about fire or explosion. We do not expect to reach any temperature even close to that. And of course, as you are probably aware, we've gone to great lengths to reduce any fire hazard in the spacecraft under any conditions Lee, do you know the temperatures?

BELEW The temperature that we're monitoring - that represents the bulk temperature internal is running around 109, 109.5 in that range right now. That is a decrease from what it was running, say last night. We did make a change in the attitude of our orbit, in order to gain more or less Sun that would be striking the area that we're getting our heat into it. That would be on the orbital workshop, that we feel we've lost our micro-meteoroid and thermal shield. So we - it looks like we're stabilized with this new attitude, and we think that we'll come down below that. So that isn't 109 as a number, that I think all of us understand. We've all been exposed to that temperature ourselves.

QUERY Sir, how many items in the spacecraft, and of what type of items are in jepardy from the excess heat?

SCHNEIDER Well, the first item that we'll probably get that we'll have a problem with is the film. We have some ultra-violet sensitive film onboard. I think the one that's most sensitive is the film for the French experiment, the French ultra-violet panoramic camera. That is the most temperature sensitive item that we have onboard. There are other films onboard that are less temperature sensitive than that, but none-theless temperature sensitive. Some food items would get - would deteriorate if we get up to temperatures of 130 degrees or thereabout, some of the thermally stabilized foods. We think we are probably in good shape there. The Johnson Space Center is running some accelerated tests on the food items represented - of samples of the food items that we have onboard to see if there

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is any chemical deterioration or any nutritional change or any taste change or anything like that. So we're investigating all of that kind of possibility right now. Those are the most sensitive items at the present.

QUERY Do we- are they getting - can you give me right now any efficiency readings or degree of output that you're getting from the solar panels on the workshop. You're getting some electrical production from it, and the second part to that question is, if they put up the so-called window shade, would also shade any portion of the - whatever may be operating of the panels on the workshop, and further reduce the power for the station?

BELEW The workshop solar rays for all practical purposes are not producing power. We've taken the batteries off-line, as far as the batteries that would receive power from the workshop arrays. We do not feel they are deployed. We do not plan to run the mission counting on that power. We've run our power profiles, based on what the solar array from our ATM will put out. Those power profiles assuming we get thermal balance and a shade, as you mentioned working, we do feel that we have a power budget that will allow us to conduct essentially a normal mission with some penalty of course on some experiments. So the power situation - we think we can manage that one.

QUERY ...

SCHNEIDER We're talking about a shield from the order of 20 feet by 20 feet, which will cover the area - -

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SCHNEIDER - we feel that we're talking about a shield on the order of 20 feet by 20 feet, which will cover the area - shade the area where the micrometeoroid shield had been.

QUERY I'd like to ask if you think a docking maneuver might jar the solar panels that aren't extended into their appropriate position - if the shock when the two spacecraft bumped together might help the condition.

SCHNEIDER No, I do not; however, we are continuing our theoretical analyses and we have under consideration doing what we call a soft dock. That is where you dock with three latches automatically and then you go in and manually latch the remaining latches. There are two contradictory kinds of things - you might think that it would be very good to jar them loose and have them come loose, but on the other hand you don't want them to come loose in an uncontrolled manner and continue on and cause damage. We're not quite sure we understand what the temperature condition might be in the damper in the solar array beam and, therefore, would like to be very cautious when we approach this.

QUERY Mr. Schneider, how long do you plan to stay here at Marshall? And also, where is the final decision going to be made - whether to send these astronauts up or not?

SCHNEIDER We have on our schedule a daily 1 o'clock briefing with the Center Directors on the Associate Administration for Manned Space Flight, Mr. Belew, Mr. Kleinknecht, myself and Mr. Hobbs, Mr. Kapryan, from the various organizations that are involved. And at that time each day we do assess the status of things and are incrementally approaching a decision. We will make a decision as soon as we are sure that we do not a) have to go on Sunday, that is there's no reason that we have to go on Sunday, and b) that there is a reason that we don't have to go on Sunday. So we're playing the two of them together. Right now we're continuing toward the Sunday launch. If there becomes a reason that we should not go on Sunday, and there is no rapid deterioration of the workshop that makes us think it would be profitable to go on Sunday, well we could conceivably decide to delay it another 5 days.

QUERY ...

SCHNEIDER I'm staying here tonight. I can't tell you whether I'll stay here tomorrow or not.

QUERY On the launch on Sunday, will you carry out the full 28-day mission or will it be shortened?

SCHNEIDER Our plan, the one that we're proceeding on, is to deploy any solar Sun shield almost immediately as soon as we can. That may be the first day, or may be the second day, depending upon how we develop our rendezvous and

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sleep cycles, and then proceed on a full 28-day mission. If we get the solar shield deployed, we think we'll be able to go ahead with a full 28-day mission and carry out a great number of the experiments. As we've been explaining for the past two days, we will have to make some compromises in our experiment activity, because we will not have the full electrical power available to us, and we'll have to decide which experiments we're going to do and which ones we're not going to be able to do.

QUERY Mr. Schneider, will you explain, sir, under the plans for putting out the shade, what procedures may be for the EVA. Has there been some consideration as to who would make the EVA? Will the Conrad crew or whoever makes the EVA be brought to Marshall to work out in the neutral buoyancy simulator as a practice?

SCHNEIDER The entire EVA sequences have just kind of been conceptually approved today. And we're proceeding down several paths, as I described, with no firm decision as to whether or not we do one, any one of them, or put ourselves in the posture where we could do all of them. There is no thought on any of our parts to change the prime crew. The prime crew remains as it was. There will be no doubt in my mind that those - that Captain Conrad and the rest of the crew that would be doing EVA would train in the neutral buoyancy facility; however we - -

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SCHNEIDER - of those that Captain Conrad and the rest of the crews that would be doing EVA would train in the neutral bouyancy facility. However, we do have to worry about - we have to work out exactly how we do it because we have the conflicting requirements of the health stabilization program, where we have to restrict their activities. So, members of the astronaut corps will be here, working on the EVA and helping out in developing the procedures. Precisely how we'll go about it is completely open at this time.

QUERY What problems would you foresee in one or two men deploying the shield?

SCHNEIDER You mean the difficulty of the maneuvering out there? Obviously, in EVA, you can get into a great number of difficulties , as we learned in Gemini. If you don't adequately train and you don't adequately understand what you're doing, why, things don't behave as you conceive of them in one g. So, conceptually, a great number of things could happen, none of which would be serious to the crew. Things like not being able to get beyond an obstruction or not being able to control a lodged Sun shield like this. In fact, as conceived and as described, they sound relatively simple. And I have high confidence that when we decide to go, with whichever one we decide to go, why, we will do it - we have a high confidence that we will do it. I'm feeling rather good along about now - not very good, but relatively good.

QUERY What is the chance that the crew will just stay in the command module and work out of that, instead of going into the Skylab?

SPEAKER There doesn't seem to be any scientific advantage to doing that. We have had crews up for a great number of days in the command service module. I guess they had 12 days. The command and service module is not equipped to go beyond 12 days, so, from medical-scientific experiments standpoint, we would not be proving anything and so we would not recommend that.

QUERY Mr. Schneider, the mylar screen, or whatever material that they may be using for the window shade, where is it right now? It's either being manufactured, or being brought to Huntsville, or it's somewhere. Do you know the location of it, sir?

SCHNEIDER Let me let Lee Belew answer that.

BELEW Well, there's a couple of approaches and we have a couple going here at the Marshall Center. We do have the material, they are fabricating the shield. The Johnson Center, I understand, they have some work underway to fabricate a shield that would be associated with the plan to deploy it EVA from the command service module. It's going along parallel and the basic concept of deployment, to be demonstrated by the neutral buoyancy simulation, will be done here. And we feel very confident that we have the stations located very close to the stations that are already proven. There's a concept in that we have EVA 6 times on the recovery and installation of ATM film. So, it's nothing new. We think that what's being worked out is very closely associated with the training that's already been done and I would look upon this as a delta, not a simple one, but a delta that's major in itself, but not unlike what we've already done.

QUERY What would be the weight of the shield and how would it affect the astronaut's flight?

SPEAKER We don't know how much the shield would weigh. It's very thin. At present, it's - it's just conceptual. It looks as if it would wrap up in a package, maybe about 20 by 20 by 6, or something like that. There would be some aluminum rods associated with it - and for the window screen kind of approach, for the approach using standup EVA in the CSM, the shield would probably be about the same size and it, too, has a few little tools required to hook it up to the spacecraft.

PAO We'll go now for a while to the Kennedy Space Center in Florida and accept the questions of the news people assembled there.

QUERY I have 2 questions. On Monday, when we first heard about the meteoroid shield, nothing was said about it also being a thermal shield. I'd like to know why. And the second question; what happened since Monday, when you were talking about a 16 to 21 day mission, that now makes you think you could go for 28 days?

SCHNEIDER When we first talked about the shield, we said - I missed the first words - I think you asked whether we said that it was to shade from the Sun and now we talk about it as a thermal shield, is that correct?

QUERY We were talking on Monday about it being a meteoroid shield and nothing was said about it being a thermal shield.

SCHNEIDER - shield. We then got into a serious thermal problem, which we had not anticipated being that serious on Sunday, when we talked to you. Subsequently, as I said, that became our most serious problem, and now we're talking about putting this shield up as a Sun screen, to shield the Sun from the skin of the workshop to give us thermal protection and give us a reduction of the temperatures in the workshop. As far as the mission duration is concerned, I believe I said Monday, that with CSM power, we have adequate power for about 16 to 17 days, for almost a full mission. After that, we're

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SCHNEIDER But since the medical people have not raised the subject, I assume it's all right, and I will confirm that for you.

QUERY On the EVA, you mentioned three possibilities. Could you outline briefly some of the others being considered?

SCHNEIDER ... as putting a large balloon out the scientific airlock and allowing it to inflate. Now, we looked at putting some paint on the side of the workshop to change the thermal characteristics. We looked at putting, if you will, wallpaper on the side of the workshop. Lee, can you remember any of the others that we looked at? We allowed our imaginations to run rather wild.

BELEW Several variations of each, and there's still several variations of each that we'll refine. We selected three that will be further refined there. We didn't get down to the very last detail of those, and that's the work that we'll be doing over the next couple of days.

QUERY Based on what you know now, is there a chance that the temperature inside will be too hot for the astronauts to board Skylab Sunday? And when they board it will they have spacesuits?

SCHNEIDER No, if you recall, the airlock MDA is isolated from the workshop right now, and it's temperature, if anything, is rather cool. As we said, the workshop temperature right now appears to be about 109 degrees which as you and I know is very uncomfortable, but not unbearable. And we can reduce that further, if we require it, by pointing the MDA end at the Sun. That reduces the temperature in the workshop even further. We do not anticipate that when we arrive at the spacecraft that the temperature will be anything that will be unacceptable for the crew. We probably, and we have not completely worked this out right now, but we probably would enter with a face mask, which is on board, and which had been our initial, the plan in which we would have initially have entered the workshop anyway. We'll probably keep that on a little longer.

QUERY Do you have to make a decision on GO or NO-GO before loading the fuel cells?

SCHNEIDER No. You can always detank the fuel cells, as we have done many times before, including Sunday.

QUERY To Mr. Schneider. With the thermal options still open,fabrication still incomplete, and EVA's in practice, do you honestly expect a Skylab 2 launch on Sunday the twentieth?

SCHNEIDER ... leys than a hundred percent. We do have

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as a task laid onto the centers today to come up with a detailed timeline by tomorrow afternoon, which will allow us to make that decision. The only saving aspect of this is that the ideas that we are talking about are very simple. And you've hit the key questions that we're asking ourselves. Can we train the crew? Can we build and qualify the articles? Can we get them to KSC on time? Since we came up with the concept - we decided upon the concepts today, we're giving the centers 24 hours to answer those questions, and obviously we have to get a yes on everyone of those before we would launch.

QUERY Two questions. How long could the launch of Skylab 2 be postponed and still fly all three missions, that is go for the full 140 days? And two, wouldn't a longer postponement, that is past Sunday, give a better chance to evaluate all the options you have open? In other words, what's the hurry?

BELEW The postponement is associated with the systems, the systems being the thermal systems, and, primarily the thermal system, and the content in the workshop that's exposed to the thermal environment; and our decision whether or not we can wait, as Bill inferred answering a prior question, was that, if we expose the contents, food for instance, the film for instance, to a higher temperature, it behooves us to do something quicker, which drives us to a fast decision, and then to a fast fix. It looks like we got those temperatures stabilized, and we're beginning to get them down a bit. That will give us more time to do a better planning and design and training job. If the temperature is down we can maintain our charges on our power systems to not degrade our batteries and all, there's no known, in my mind, limitation on a hold period. It would fall back into the regime of the basic design. We could hold for a considerable time.

QUERY Do I understand that you have completely ruled out any possibility of an EVA, which might go over and look at the solar panels, and see if possibly they might be able to be pulled free? Is that out completely?

BELEW We will undoubtedly do, in the Skylab 2 mission, will be to fly around the vehicle, in the CSM, and we're attempting to do that with the television camera on, so that we can see just exactly what the status of the hardware is up there. Just what kind of damage there is. Just what the configuration is. We're not even sure exactly what that is. And we have not ruled out that we might do some safe kind of activity that is, perhaps push with a long pole, or something like that, from the CSM. We do not at

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this point - and I emphasize at this point, because all thoughts are in a state of flux, too. We do not at this point think that we would send a man EVA, crawling down the solar array breaking any hardware loose. We don't think that looks like a good safe thing to do. We'll break from Kennedy Space Center now for a little while and go to the Johnson Space Center at Houston, Texas, and accept questions from that point. We can return to Kennedy, and here to Marshall, if there are more questions. Now to Johnson Space Center.

QUERY I understand that the Air Force cameras out at Cloudcroft, New Mexico, managed to get a photograph, either last night or today. One, did they see any debris associated with the workshop, and two, is there any indication that the meteoroid shield is fouling the two solar panel arrays?

BELEW We are currently using all of the Nation's facilities that are available to us, to try to assess the status of the Skylab. Unfortunately, some of those equipments are classified by the Department of Defense, and any comment on them will have to come out of the Department of Defense.

QUERY Since you've given the center 24 hours to answer the three questions you listed, does that mean that we could have a GO NO-GO decision for a Sunday launch by late tomorrow afternoon?

SCHNEIDER ... hit a hard rock and come up and say "Gee, we can't make it", and I'm not ruling out anything either before or after that. I know we have to make it by Saturday afternoon.

QUERY Okay. You said that the package - That such such a thermal blanket or shield might be packaged in is a 20 by 20 by 6. I would assume you're talking about inches, feet would be pretty bulky. What would be the dimensions of the shield that was being studied here?

QUERY Okay, I'll try again. Was the package that the shield would be housed in 20 by 20 by 6, is that inches and not feet? And what are the dimensions of the shield that was being looked at here, and a third part when you use shield and shade, are you using those interchangeable at times.

BELEW They are interchangeable. We're looking at a mylar rubberized sheet - fabric - the kind of things that can be draped -

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BELEW - Mylar, rubberized sheet fabric, the kind of things that can be draped - be placed over the spacecraft to shadow it, to put in a shadow. The 20 by 20 by 6 is just an estimate number in inches, and it may come out a lot different than that. I'm not sure it'll come out a lot different, but you know, I'm fairly certain it won't be 20 by 20 by 6, but that's the kind of volume that we're talking about. And the one at Houston is about the same size. A Houston idea, as I said, is to use the astronauts in a standup EVA mode, and to, if you will, tuck the end of - the ends of the shield under the vehicle, back at the interstage end, and then to pull it on forward up toward the ATM. And since they both have to cover the same kind of area, I expect they're both on about the same size. The Marshall idea that they're pursuing is to deploy it from the other end, or the ATM airlock end, and then deploy it back. And when I use Marshall, Houston, these are not center-competing ideas. We have merely assigned primary responsibility to those centers. There are people from both centers participating in the development and the concept. It's not a competition. It is a team effort, and we've deemed it advisable to break up the management of those teams in that manner.

QUERY Sir, could you go into a little bit more detail of how you do that standup EVA from the command module? How exactly would you put the shade over it?

BELEW I'd like to, as I said, it's very conceptual and the crew right now are busily engaged in trying to simulate it. Roughly what the idea is, to have standup EVA working behind- behind that the - what would you call it? - -

SCHNEIDER The old thruster end - -

BELEW Oh, it's the aft end, as you sit on the pad, that separated from the propulsive stage just below it, that you're talking about. They'd stand up EVA in the CSM hatch and push ropes, if you will, under various parts of the structure at that end, one on either side, and then pull the front end up towards the ATM, and making kind of like a triangular sail, if you will. That's an overly simplified description. It's hard to do it without a blackboard and without waving your hands.

QUERY On the gold foil, is it thin enough, the gold foil on the workshop, is it thin enough to allow infrared through, and is this what's adding to the heat problem?

SPEAKER Aluminum structures bonded to the - aluminum structure is very thin, and it's just interval to that, as far as the heat transfer into the aluminum pressure cell and through the insulation.

QUERY Would you discuss the umbrella concept

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and how it would be made, and how it would be erected or put up, and who has responsibility for it?

SPEAKER First part. Repeat the question, please.

QUERY Okay, would you discuss the umbrella concept, and how it would be constructed, and how it would be put in place, and which center has the responsibility for it?

SCHNEIDER Well, the Marshall Center is pursuing that and that is kind of a backup mode. The concept is very roughly to put something out of the scientific airlock, and have it expand. It is very little more than that, as a concept right now. Perhaps Lee, you may know some more about it.

BELEW Well, very little. The basic concept would be to use the same interfacing structure that we interfaced with that scientific airlock work when they deploy an experiment. For instance, we take an experiment case and put within that an expandable structure, and ... out through the airlock, and once it's off, then initiate the deployment mechanism. Those kinds that I'm thinking of have to do with pressurization of cells that pack then as rigiditers and then pull out a sheet. The exact details of that I'm not personally acquainted with. We have McDonnell Douglas West working this as a primary effort on their part. These kinds of devices have been used before. And as Bill said, it is a backup that will be pursued to some point for the next 2 or 3 days.

QUERY You mentioned that the films to be used in the UV panorama were affected by heat. Does that mean that the experiment is wiped off from the program?

QUERY You mentioned that the films to be used in the

French UV panorama experiment were affected by heat. Does that mean that the French experiment is to be - have been downed, or wiped out from the program?

SCHNEIDER I'm afraid I can't really answer that question. We'll really have to wait for a little more detail analysis of exactly what the temperature did get to be in that. I'm afraid it does not look encouraging from what I've heard, although we will continue our investigations. There is always the possibility that we can carry up some film in later missions in the command and service module. Let me - say that we currently feel, and obviously it remains to be proven, we currently feel that if we can get up there and can deploy the - some sort of a thermal shield, it is perfectly possible and conceivable that we will be able to fly both a 28 and two 56 day missions. Right now there's no reason that we can't do that, assuming we can get this thermal problem worked out. If we can do that, it'll be our intention

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to replace any damaged articles in later CSM flights, and continue on and get a maximum amount of scientific investigations. Now I don't believe it's been established that the film has been damaged to an extent that it's not usuable to get good meaningful data, but I think Bill pointed out that this is one of those that would be the first suspect.

PAO We'll go back to the Kennedy Space Center, now to see if they have some more questions.

PAO Before we have any more questions, we do have a brief statement here. The doctors at the Johnson Space Center are performing a detailed study on all drugs and medications in the inflight medical support system and the Skylab orbital workshop. A NASA spokesman said we may expect to lose as much as 50 percent of the 62 items of drugs and medications aboard the spacecraft due to the high temperatures. Tests have been made of all the drugs and medications at temperatures of 95 degrees. The additional temperature is causing the doctors to fall back and make an evaluation of this problem. Some of the sleep medications, injectables for severe allergies or shock, and also some of the ointments are affected. Among the stable items are those for nausea and pain killers. Major drug companies are providing excellent cooperation in furnishing background data on drugs and medications affected by this change in temperature. A major effort is underway to repair replacement for these items, and label them as resupply items aboard the 116 command module. That's the end of that statement.

PAO We, unfortunately, missed the name of the man making the statement. Would you give that to us please?

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PAO Assume there are no more questions. Thank you very much.

QUERY Is there an Apollo lunar tool package, immediately available, that you can quickly adapt to provide the T-Bar, and some of the other gadgets you need to stretch a curtain or shade or an umbrella?

PAO Go ahead Houston, with your question.

QUERY I understand that if there's film in the EREP multispectral camera, that that film is probably cool and usable, but there was some uncertainty as to whether there was film in there, in that camera at launch. Has that been determined yet?

PAO Anymore questions Houston?

SPEAKER Did you want me to repeat that answer? I do not have the answer. I will provide it, if you wish; however, if you're down at Houston, they can get the answer as soon as I can.

QUERY At what point in time will you make a decision as to whether to attempt the repair or fix on the solar panels? Will it come before or after you attempt to put out the cover?

BELEW Let me say that that kind of decision, we feel, will probably be greatly influenced by what Captain Conrad sees when he first gets up there. And I could only speculate and say that if it looked possible to repair the solar array, I would guess, based upon, you know, thinking about it here, that you might want to do that first. However, it's perfectly conceivable that when Captain Conrad gets up there, he may decide not to try to do anything, or he may decide to wait awhile, or he may decide to deploy the sunshield, or he may decide that he cannot do any of them. There are a great many of that kind of decisions we're going to have to leave in the hands of Captain Conrad. As I stated, we're trying to shape the rendezvous maneuver such that we do have some TV during the final Phases of station keeping, and during the fly around, which will enable us on the ground to see something, and to give Captain Conrad advice. As with all crew commanders, the captain in charge will, of course, have the final decision.

QUERY The Mexican experiments will affect by these problems?

PAO Anymore questions Houston?

Query The Mexican experiments will affect by these problems?

QUERY The Mexican experiments will affect by these problems?

SCHNEIDER Was the question Will the Mexican Earth

Resources Experiment be affected by these problems? Yes, in that we're having to change our time line, and we will have to revise all of our Earth Resources activities. Just precisely whether or not that is one that we will or will not be able to do, we can't say at this time. We think that if we get the Sun shield deployed, we will be able to do a great deal of the original experiments as planned. And I would give a very encouraging answer that I would think that we be able to get most of the EREP, if not all of the EREP, objectives. Let me just revise a question, an answer that I gave before, and I don't know whether this came over on the PAO loop as it did here, but earlier there was a question about the status of the medical equipment and I said that it had not been raised to me, aad so I therefore assumed they were okay. I subsequently have been handed a RTQ by Dr. Dietlein , which was issued today, which does not say that everything is okay. It says that there can be some deterioration in the medicine, and that it is being looked at by not only the doctors but the major drug companies, and they are cooperating to determine just exactly what the status is, and to provide what kinds of replacement items we might have to put on the CSM 116.

QUERY Mr. Schneider, in the course of the last few days, have you had any time to think about the implications of the problems you're facing now? The implications in terms of the overall space program and it's future?

SCHNEIDER I've been sticking pretty close to the issues currently at hand, and I will be doing that until we get things straightened out.

QUERY Mr. Schneider, the EVA that you were talking about, out of the scientific airlock. As I recall, this particular location in the orbital workshop has had some of the higher internal temperatures associated with it. I gather that in thinking about the EVA, there is no worry about the Astronauts actually entering the workshop before you get this shield deployed, if you elect to go the scientific airlock route.

SCHNEIDER I want to make sure that you understood properly. The scientific airlock is only, if I remember correctly, about 9 by 9 inches square. We're not talking about EVA. The reason we are keeping this option open is that you do not have to go EVA, you can deploy it, assuming that we're able to come up with an adequate concept, you can deploy it through the scientific airlock from an interior position in the workshop, just as we deploy TO-27 or SO-93 or any of the other scientific airlock experiments. Once it got outside the workshop, it would automatically deploy,

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like an automatic umbrella, or a blow-up toy, or something like that, and provide a Sun shield. Again, as far as the internal temperature of the internal habitable area is concerned, the temperature in there currently appears to be about 109 degrees. If we felt it possible we think we - we know we can lower that even more by placing the MDA end of the spacecraft pointing at the Sun. So we can reduce it if we think we have to, we can reduce it even further. And as I said in all probability we would enter the workshop by using our facemasks and our portable oxygen supply.

QUERY Mr. Schneider, you mentioned you could hold for a considerable time presum -

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QUERY Mr. Schneider, you mentioned that you could hold for a considerable time, presumably on the pad. Roughly, how long is that in days or weeks?

SCHNEIDER Repeat - -

QUERY You mentioned that you could hold for a considerable time, presumably on the pad. Roughly, how long is that? Is it open-ended, or could you tell us in terms of days and weeks how long you could hold?

SCHNEIDER It's currently open-ended. Obviously, if there was some reason that you are talking about months or something like that, you might consider rolling back to the VAB, but there's no reason why we have to get off the pad.

QUERY Red Mueller ABC, Bill we lost you on this question a while ago, so I'll repeat it and then get out of the way. Do you have currently available an Apollo lunar tool package to give you a T-bar, extension rods, and so on, that are immediately flight ready, and can you adapt those and take them quickly?

SCHNEIDER I cannot give an affirmative answer on that question other than to say, all of the Houston and Marshall resources are looking at everything that is available, and we have turned on the Marshall Center to build whatever tools are necessary and to collect whatever tools are necessary. We have the right people at Houston and Marshall talking to one another, and those tools that are needed will be made available. We do not think any tool availability will be a constraint.

QUERY Barry Kaysvill, Huntsville. Mr. Belew, will this sunbonnet that's going to be place around the OWS work as well as you thought the original shield would, and could it be mended in orbit during EVA if it were pierced by a meteor, or torn by accident?

BELEW The thermal analysis that's been made on the concepts indicates that we will be able to control our habitable environment within original designed specs. The repair of such a shield is not in the current plan. If you are thinking of a slight tear during the deployment of the shield, a slight tear, in my estimation, could be tolerated. If you're talking about something very major, then that again would be another decision point. And it would be made only after we see what effects it might have on our thermal balance.

QUERY ... the Italian News Agency. The New York Post at least this afternoon published information concerning the possibility of a 5-year delay in the entire U.S. space program. Could you confirm officially, or elaborate on that?

SCHNEIDER - up and from the airlock end, would consist

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of the astronaut standing in the - at the airlock end, securely fastened and pushing, if you will, the shade down workshop. In the other case, we would have standup EVA in the CSM, secure one end to the workshop, and then pull it from the CSM up to the other end. So we don't envision having any capability to walk down the workshop side and repair any rips or do anything like that. That's not something that we have the capability of doing.

QUERY - Italian News Agency. The New York Post today published that information, at least,the New York Post con0 cerning the possibility of the 5-year delay in the entire U.S. - space program because of the eventual failure of the Skylab project. Could you confirm officially, or elaborate on that?

SCHNEIDER Only in one sense. There's been no failure of the Skylab program. We have reasonable hopes that we are going to be able to conduct a very excellent series of experiments on Skylab.

QUERY But in case of failure, in case?

SCHNEIDER I haven't given it any thought. I could not comment in any sensible manner as to what, either success or failure of Skylab, has to do with the subsequent mass of programs.

QUERY For Bill Schneider. How much additional storage space is there in the CSM to take all these tools, and possibly food and medicines up to the Skylab? Additionally, when you talk about saying that if you get the shield on, you think you can then fly two 56-day misisons after the 28-day flight, would this mean that there are 7 active days and 39 very quiet ones on those two additional flights?

SCHNEIDER On the CSM stowage world, we are to off load - they're going to have to off load some of the equipments and we are going to have to find some ingenious corners to add some equipment. We have not finished the stowage review, we don't know exactly what we would have to take off in order to fit these things. They will not fit in without some change, as I'm sure you're aware. We have not determined what has to be taken off or just exactly how we would get these equipments in there. That remains to be done in the next few days. As far as whether or not the 56-day missions would be - would have a long, quiet period, it would have a long period, as Lee Belew said, with a power supply restricted to about 800 watts for our complement of experiments. I don't remember exactly what our experiments required before, but it was something on the order, if my memory is correct, about 1,000 watts, so we're not talking about a day that's highly inactive. What it will require that we do is that we manage

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our experiments better. If you remember the original Skylab flight plan, we had a great number of activities going on simultaneously, and electrical power was not a factor in our consideration, as to which activities to perform simultaneously. With the power restrictions such as this, I anticipate that we would have to do a great deal of power management, that is, be very careful to select the experiments to be activated when we have a suitable supply of electrical power. As you know, when we quote power requirements, we generally are quoting in terms of average power requirements, and the power does change as a function of where you are in the orbit and where you are in the day of the year. So we do not anticipate, at this time, that it would be a highly inactive period. We do not think at all that we would be able to do as much as we had previously planned.

QUERY Two questions. In the event that you go the route of the standup EVA from the CSM, I'm not quite clear where the CSM would be when you were doing this. The second question is, which astronauts will do the first tests in the neutral buoyancy simulator of any procedure you come up with?

SCHNEIDER See if I can describe the sequence on the standup EVA. The CSM would be located to the - on the S-2 workshop interface side of the workshop, that is the side that would be down when it's on the pad. The astronaut would be standing up in the hatch and he would have a tool, or a probe, and he would attach two ends of the shield to either side of the workshop. He would then get back into the spacecraft and he would have a tether, and he would maneuver the spacecraft up to the ATM end, at which point he would attach the tether to the ATM handrail, existing handrail. He would then - -

END OF TAPE

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SPEAKER - through the ATM end, at which point he would attach the ATM handrail, the existing handrail, he would then pull on the tether, release the sail from a parachute-like bag, and pull it up, much as a sailor would pull up a sail, and then attatch it. This all would be done with a probe and a pole, allowing the spacecraft to remain a dozen or so feet away from the workshop. After completing that activity, why he would then dock up at the front end and, hopefully, we would go back to our normal mode of operation. The flight crewmen, right now - and it might change, obviously - right now we think that Rusty Schweickart will be the first crewman into the tank here working. I do not know when he was coming or how he is coming. I only know, when he gets here he's going to be very busy.

QUERY I have a couple of questions concerning the different options you still have. Is the umbrella concept identical with the balloon concept, or do they still have both of these?

SPEAKER ... in the balloon concept. They're very similar, though not exactly comparable. The umbrella concept kind of says there are things around that, like life rafts and things like that, that you can pop, like a CO2 cartrage, and they open up almost automatically, and that's the kind of thing that they're talking about, instead of a large weather balloon type thing.

QUERY Another action was paint. You spoke of paint. That was that paint be deployed, if it would be deployed at all. That would be painted, so to speak.

SPEAKER What we did was ask ourselves whether or not it was possible to do. From a physics standpoint, we think we could get paint on the surface. From a practical standpoint, we were not able to come up with any easy way of getting a paint can, if you will, along the vehicle, so that was abandoned rather early. We are not considering that anymore.

QUERY The same goes for the wallpaper probably.

SPEAKER ... require that the Astronaut maneuver in some way along the surface of the workshop. We could not figure out any easy way that that could be done and we have therefore abandoned it, and also, the wallpaper, surprisingly enough, if we can deploy a - even a fabric shield, it provides some micrometeoroid protection, although obviously not as much as the aluminum, whereas wallpaper would not.

QUERY Without compromising the security of the equipment involved or going into any detail, could you tell us with a simple yes or no terms, whether or not DOD

SKYLAB NEWS CENTER
Houston, Texas

SKYLAB 1 STATUS BRIEFING
Johnson Space Center
May 16, 1973
9:40 a.m. CDT

PARTICIPANTS:

Charles Lewis, Flight Director
John Riley, Public Affairs Officer

PAO Orienting today we have Flight Director Chuck Lewis. He'll start off with a brief status statement then we'll take your questions.

LEWIS Well, first let me say that I was not on the console last night. So, I'm not aware of a lot of the happenings during the night. I was off console with another team working on some of our plans, contingency plans. I do know that they did initiate some maneuvers last night to try to get our thermal problem under better control. And they were basically going to ZLV for one rev, back to solar inertial for a rev, back to ZLV for a rev. I looked at a very limited amount of thermal data just to spot check very early. Some of the data - temperature measured - indicated some stabilization. But it was very premature and I wouldn't say that's solving our problem. And that's about all I know about the online effort last night. Basically what I was involved in is looking at working up an activation checklist for the airlock module MDA, a minimum power activation list, checklist, which will probably be timelined today. We looked at stowage on the command module, changes to that. In other words, we got to make provisions to get the thermal shade or shield that we decide to use up. And there were other stowage changes that we're examining. I think they're going to attempt this morning to go through that initial stowage list in the 1-g trainer to see how well that works. That's basically about it. Any questions?

PAO Bruce Hicks.

QUERY Chuck, how much contact did you have with the Huntsville people on thermal - working on thermal problem last night? If you didn't have direct contact, what did you hear along the grapevine?

LEWIS I hear they have a proposed thermal curtain or shield. And that they will probably do some testing on that today.

PAO Go ahead.

QUERY Could you explain anything that you might know about the thermal shield, any particulars at all? What type it might be or anything like that?

LEWIS I'm not sure of the exact material they're talking about, probably aluminized Mylar or some very thin opaque material utilizing some of the extension rods. I don't know what type but probably similar to the core rods we used in Apollo so that the crewmen can work from the airlock module hatch and take and extend this curtain out a section at a time and with a T-connector with rods on the very end, you know, to give it some shape as he extends it. That's about all I know at this time on that.

PAO David Salsberg.

QUERY Does that mean that the Marshall calculations indicate that the stabilization level will be too high to live without some kind of a shield?

LEWIS It's already too high. The internal temps are too high to inhabit the OWS. It doesn't mean that we can't go into the OWS at the present temperatures, but it does mean that we wouldn't want to use that as our living quarters.

QUERY But, have attitude maneuvers pretty well been discounted as a kind of a permanent solution here?

LEWIS I think so. There may be cases where we do that periodically. It depends on how well the fix works.

QUERY You say that you've been working on various contingency plans but you spoke of only one. This thermal blanket would seem to some people to be the most far fetched. Do you say now that it's the only conceivable thing you've come up with and that it's possible, it's realistic.

LEWIS I think it's possible, realistic. There are other proposals, other alternatives. I've just spoke of the one that I was aware of at Marshall. They have - I'm sure that they have some alternatives in work here on the Center. But, I haven't spoken to those people. Let me put it this way. There's an EVA working group outside of the one I was involved in and we were not addressing specifically the EVA or the type fix they would come up with. We were basically allocating a block of times so to speak, on a day where we thought we could work contingency EVA in.

QUERY If indeed you do pursue this thermal blanket approach, how soon will you be able to speculate the SL-2 crew might be able to go up? And what will they do, just surveil and then come back?

LEWIS I don't know how soon we could have the fix ready to go where we can make a Sunday launch or not. I really don't know that. If the crew goes up and we take the fix, and it in fact works, then they won't come back. We will continue with the mission, understanding of course, we're power limited with only the ATM power modules.

QUERY With the stowage study is there any determination yet as to whether or not there's going to be room enough for 3 people; and also, would it be a matter at this point do you know, of having to take food to replace what's - -

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QUERY ... a stowage study. Any determination yet as to whether or not there is going to be room enough for three people? And also would it be a matter at this point, do you know, of having to take food to replace what's there in any way, shape, or form?

SPEAKER We're planning on taking three crewmen. We're taking - At the present time, the proposal I worked on was to take the present food allotment, no change. We'll assume that we can get into the OWS for food. There's - I might say there's five days Skylab type food on board plus another 3 days of survival or contingency food that we could use. Yes. So we're looking at 7 or 8 days if we cannot get into the OWS as far as food supply.

QUERY Is the frozen food on board still frozen?

SPEAKER Yes.

QUERY Let's assume we have a launch. What can you tell us about rendezvous and docking plans? Will you survey for one REV, for example, feeding back television for a close look at the damaged areas?

SPEAKER Bill Shaffer is working that particular area, but I might give you some basics on it. It's - Of course we'll launch either Sunday or another five days later with ground track considerations. Very close to a nominal launch and rendezvous, I understand. They may reduce the ZLV orientation to one REV instead of two. That's under consideration. They do intend a fly-around inspection and I believe they also intend to have video on that as well as photography, crew photography. And then the docking. Now depending upon what fix they come up with, I don't know whether there'll be any kind of an EVA required, undocked or not this time.

QUERY Looking in that case since you're launching on essentially the same time table, are you looking at an M equals 5 rendezvous?

SPEAKER Yes.

QUERY So all of these events then would happen at approximately M equals 5 plus the length of time for observation, what have you.

SPEAKER Yes, and we would obviously have to plan our video coverage over the continental United States. So would be probably the sixth rev after launch that we'd get the video. I think that's right.

QUERY Have you any idea how long it would take the OWS to cool down, assuming they could make a fix, so it would be habitable?

SPEAKER No, I really don't. We do know that the scant - the external skin temps would tend to cool down fairly rapidly; we've seen that from the maneuvers. But there is a lag on the internal temps, and I really don't have a feel for how long that would take. But with internal temps now that we've gotten now, we can have the crewmen into the OWS. Like I said, if we want to go in and retrieve something or have a look at something, we can do that.

QUERY This scheme you described at the beginning sounds like a doubt to EVA, is that correct?

SPEAKER Yes.

QUERY What are the internal temps now?

SPEAKER I don't know what they are right now. At about 2 or 3 o'clock this morning, when I did look at them (I looked at 2 or 3.), an internal wall temp near the film vault was, as I recall, about 105 degrees. An internal temp - wall temp near the ambient food locker was - I believe it was around 100 to 105. And that's about all I looked at.

QUERY Do you remember a maximum scan temp?

SPEAKER No. I don't. I sure don't.

QUERY I'd like to ask a little bit more about this thermal blanket scheme. I realize that you're not at Huntsville, but it sounds to me still a little bit as unlikely as a skyhook. Could you visualize for us how so large an area could be fixed by a man standing or - how would it work?

SPEAKER Well, let me describe a way. I'm not sure this is the way, but we take several extensions up. I don't know what the length of the extensions would be - 4 feet, 3 feet, whatever that's attachable. You take two thermal rolls up; you roll the aluminum Mylar up a couple of rolls. You got a T-connector. Take two of the extensions from the T-connector, and take one and place the T-connector perpendicular to the two and attach your two rolls. Okay. Bead that out and roll your blankets or blankets - I'm calling them blankets, but part of the material being back, put another extension on; roll them back. They may have to attach the blanket somewhere back to the ATM so that, you know, you can handle it. Just keep moving it out. Then move it out to the desired length and have some sort of clamp or attaching device to the ATM structure. Does that basically give you an idea of it - does it?

QUERY Well, would they have to do that in several places around - what in essence if you're looking straight on at the clusters - the perimeter so that when they're finished, they'd have a series of flat sides, so that the thing would not be a cylinder anymore?

SPEAKER That would have a flat side, I would guess. A flat side shade, just like a curtain. Just like taking a

curtain and attaching it to one end of the vehicle and just pulling it down to the other end, just a shade flat, and I don't know what the area of that would be.

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SPEAKER ... only one side. The plus C sides are a big concern. We're flying solar inertial most of the time, and that's where we're getting the heat.

QUERY With everything you have described, chances of a launch this Sunday seem to me to be rather unlikely. I wonder if you can share your thinking along those lines? It seems there's a great deal to do between now and launch date.

SPEAKER There's a great deal to do - I don't know what equipment Marshall has on hand. I don't know whether they could use it for flight, for example. I understand they are going to do some testing today with equipment. If that type of equipment is flight qualified, so to speak, I would think that the crew would at least - I think Rusty Schweikart is at Marshall now for this. I think that the prime crew would, if not go through a complete training exercise with it, would at least have some kind of walk-through procedure to get a feel for the effort. I - I don't know.

SPEAKER It's rushing things a bit.

QUERY You said a moment ago it'd be just like taking a curtain and attaching it to one end of the vehicle and pulling it to the other end. Actually more precisely it would be more like pushing it to the other end, wouldn't it?

SPEAKER Yes, basically.

QUERY Like unrolling a window shade if you were hanging at the top and pushing it down.

SPEAKER Right.

SPEAKER Okay, thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 15, 1973
8:50 p.m. CDT

PARTICIPANTS:

Donald R. Puddy, Flight Director
John McLeaish, Public Affairs Officer

SKYLAB PC-8A
Time: 20:45 CDT
5/15/73

SPEAKER - on duty, and as I understand it in addition to questions from Houston, we'll have some from the Cape al..., but why don't we open now with opening comments from Don, and then throw it open for questions first from Houston.

PUDDY Okay, I think there were two key items we went into today's shift with. One was to get the habitation area pressurized. We did start that about 1:30 this afternoon. And as I left the Control Center, we were approaching very closely our expected 5.0 PSI. We followed the nominal pressurization profile, no problems at all with that particular sequence. One of the other areas that we consider to be of prime concern was the attitude control system. And at the present time, I'm happy to report that we are in our standard attitude control system configuration. We have two rate gyros associated with each of the axes that are updating strap down system. We are using the control moment gyros of course as our nominal method of attitude control. In other words, we have gone out of the TACS only mode of control that was reported to you last night. We have enabled our momentum dumps, which means that essentially we go through a maneuver during the dark side period where we dump the excess momentum that the CMG or the control moment gyros do accumulate. And we have gone through, I think about five of those dumps by this time. And everything looks very nominal. So the two items that we started out this shift with to try to figure out have been accomplished. We have what we consider to be a stable and habitable cabin environment. I will say a few words about the thermal conditions in just a minute. But, from a pressure standpoint, it looks very stable. And from an attitude control systems standpoint, we have an excellent attitude control system. We have only one failure which you may or may not have heard about, and that is we have lost one rate gyro, we believe, in the Y axis. As far as the thermal system is concerned, on an outside structural temperature basis, we're running off-scale high around - which means it's greater than 295 degrees on the side facing the Sun. As you move around the periphery of the workshop, we drop to about 140 degrees, 90 degrees off of that line. And of course as you get to the cold side, we drop somewhere to the 90 degree region. Now these are outside structural temps. On the inside, some of the temperatures are showing, again back to the Sun line, somewhere in the order of 120 degrees. And on the cool side, or the minus Z side, some where around 70 degrees, which means right now that our average gas temperature in the habitation area is somewhere around 110 degrees. This certainly warmer than we would like it to be. And of course I'm sure that you've heard from Mr. Schneider today in his earlier press conferences that we are looking at the various options that we can take to go ahead and place some sort of a shield or some sort of a mechanism over the plus Z side such that we can lower those gas temperatures inside the habitation area. As Milt has pointed out to you we have essentially shifted into a two-team on-console approach. I'm pulling one team, and Milt Windler is pulling another team. We also have two other teams under Chuck Lewis and Phil Shaffer that are working several of the major action items that must be accomplished before we will be ready to go on Sunday hopefully for the launch of Skylab 2. And they are working such things as changes to the activation checklist, any changes to the rendezvous profile, various EVA options that we may have that Mr. Schneider has already discussed and things of this nature. We have, as you might expect, used a little bit more TACS gas, which is our attitude control system gas, than we expected. Nominally at this time in the mission we would have expected to use about 8 percent. However, we have used- -

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PUDDY - attitude control system gas than we expected. Nominally at this time in the mission, we would expect it to have used about 8 per cent, however we had used approximately 18 per cent of that gas. This certainly is no problem. We're still well above any red line that we have for the mission, and all of the options that were discussed by Mr. Schneider and from here last night are certainly still viable with that remaining amount of TACS gas. Presently under CMG control we are not using any TACS gas at all. So with those as opening remarks, let me open it up to you for questions.

PAO Okay, let's start the questions, please, will you raise your hands, wait for the Mike, Bruce Hicks, UPI.

QUERY Don, when you were telling about the inside temps there, and you were telling about 120 degrees on Sun line, and 7 degrees on the cool side, are you talking about inside skin temp, or are you talking about more or less an area temp. Is that just on the skin, or is that any way to tell from the - what atmosphere is in there now?

PUDDY I'm trying to quote to you average temperatures, some of these are on the inside, right up close to the insulations, some of them are on the floor grid work, some of them are on the dome. There are some temperatures that are higher, some that are lower, and I'm just trying to give you a general ball park feel for the average gas temperatures, or the average internal temperatures in the habitation area.

QUERY Okay, how does this compare to what there was, say, early this morning? We were told to expect these to climb, not at a very fast rate, but to increase - how have some of these different areas increased from what degree to what degree generally?

PUDDY Well, I think you can say, again in general, that the maneuver we did last night, we did flatten out most of the temperatures. However, since we have gone back into solar inertial, of course we have remained there throughout the day, we have noticed again, a trend, an increased trend. Right now there is a large meeting going on in Huntsville, where they are discussing just exactly where we expect these temperatures to level out. But this is certainly not an alarming trend, by any stretch of the imagination, and I feel by certain - I feel certainly by sometime tomorrow, we will be able to give you a real good feel as to what we expect the maximum temperatures in those various areas to be.

PAO David Salisbury

QUERY Yes, 2 questions. First, is the - having pressurized the interior of the cabin, will this create a greater heat sink for the heat coming into the spacecraft?

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Or, - and also, how much can the heat exchangers handle? This - I get the impression, but nobody's really said, that this is, you know, higher than - more heat than the heat exchangers can handle in a fully pressurized configuration.

PUDDY Okay, let me start out by saying that, on every new spacecraft that you launch, you have what you call preflight predictions. And of course, our preflight predictions were based on having a meteoroid shield, and we don't have a meteoroid shield. Also, even if we had, there are certainly some variability that you would expect in systems capability when you actually get into orbit, and stabilize out. I think that you would probably have to say that based on preflight predictions, unless we stabilize out at a temperature somewhere in the area where we are at right now, that the heat exchanger is not going to be able to bring this down into what we will consider the absolute norm internal cabin temperatures. But as far as what the maximum cabin temperature is going to be, I think is going to be dependent on what we get out of this thermal conference that's going on. So I can't really give you a direct answer right now, to your question. It's going to be marginal. Let me put it that way.

QUERY One other question, if I could. I've heard a rumor at one time, that one of the TACS thrusters was stuck and the thing was - and the spacecraft was tumbling. This might be totally wild, I just wanted to ask if it was.

PUDDY I think I have been on shift throughout most of the - -

END OF TAPE

QUERY - this tumbling, and this might be totally wild, I just want to ask if it was.

PUDDY I think I have been on shift throughout most of this, and if we had a stuck TACS thruster, I'm sure I'd have been aware of it, and I know of no indication like this. I think the only incident that has occurred was where we did have essentially a rate gyro redundancy management failure, and we did get an attitude excursion one time there when we switched from 1 of the backup rate gyros to one of the prime. And let me give you a few words on that. As you probably were following, we had many, what we called rate gyro redundancy management failures. I think we had 4 or 5 in the Y-axis, one reported in the Z-axis, and a couple in the X-axis. This afternoon before we went back, and essentially enabled our normal scheme, which means that we have 2 rate gyros in each axis, who are feeding information in the integrals of that information, are averaged together - to update the strapdown. What we did was, we went in and computed the drift compensation for those gyros, and once we accomplished that drift compensation, and updated those rate gyros, and then went back to normal control, we've had no problem. So, I think the rate gyro redundancy management failures that you heard quite a bit of concern expressed about in the past 24 hours - that problem has been eliminated by this drift compensation update.

PAO Abbey Brent, Washington Post.

QUERY If the temperatures you're seeing now from the pressurized cabin are real, does that mean that you have to go EVA and do some kind of protective shielding? And the second question is, is there anything in the mission rules that say what the backup thermal protection is if the micro-meteoroid shield went?

PUDDY I'm not aware of anything in the mission rules that says what the backup is. Again, let me say, that are many, many options being discussed at this time. Certainly, some sort of a backup meteoroid shield type device is high on the list of investigation. There are several options that have been discussed in this area. Some of them do require the crew to go EVA, some of them can be accomplished essentially by just doing something like the extension of a - the SO73 experiment with the balloon attached from the plus-Z SAL and inflating the balloon. So, there are numerous options being investigated there, and I think one of the key points, that needs to be pointed out here, is that even though the meteoroid shield normally surrounds the entire habitation area, I think it's fair to state that if we can cover, probably, let's say plus or minus 30 to 40 degrees off of the plus-Z line, longitudinal line, along the habitation area, that we would have solved the majority of the thermal problems.

PAO Let's see, do we have questions from the Cape at this time? Oh, I'm sorry, here's a question. Kent Beffle, Newsweek.

QUERY Could you describe the experiment with the balloon that you mentioned?

PUDDY Like I say, these are all in preliminary stages, and I have been working the on - console shifts, so some of this information is coming to me strictly as they pass by. But as I understand, it - you know we do have the capability on one of the experiments, where we can extend it from the SAL. And basically, what this option is, is that you can use that extension mechanism to place a non-inflated balloon outside the plus-Z SAL. It then can be inflated and form a protective shield over the area in which I'm talking. In other words, along the area that is facing the Sun in solar inertial attitude.

PAO Bruce Hicks.

PUDDY Did that clarify what you're - - I think I've left you a little blank.

QUERY Is - -

END OF TAPE

SPEAKER I think I've left you a little blank.

QUERY Is that the most popular remedy at this time?

SPEAKER I don't think there is a most popular remedy right now. A couple of other options that I've heard of - one option is that you can actually take the film transport booms that we have, and you could operate out of the center work station. The only problem being that, normally, you're facing the other direction so you would have to provide some sort of capability for the astronauts to face in the other direction. And you could then deploy a meteoroid shield type device from that particular position down the length of the habitation area. That boom normally extends out approximately 30 feet. And we can extend that to the necessary length which is about 40, 42 feet by attaching to the end of it a couple of the Apollo core sample tubes.

SPEAKER Well let's see here. Why don't we take the question from Hicks here and then we'll get back to that.

QUERY I kind of follow on this very same thing. This balloon obviously isn't a dime store balloon. How big is it and is it the type of thing they're going to have to bring on, or did you mention it as part of another experiment or was that only the extension arm you were talking about?

SPEAKER The only part that is part of the nominal spacecraft equipment is the extension mechanism that is associated with the S073 experiment. The balloon itself certainly is, or the inflatable device, is certainly not a part of normal equipment. Some of these devices, now let me emphasize, I think Mr. Schneider brought this out in his press conference, are items that would require some fabricate design and fabrication time.

SPEAKER We'll take one more question from Houston and then switch to the Cape. Kent Beffel, Newsweek.

QUERY Is such a balloon ready?

SPEAKER I'm certain that it is not.

QUERY So it would mean how much delay in getting the balloon?

SPEAKER Unless Mr. Schneider had some answer on that particular question I don't - -

QUERY One other question. That 120 degrees, is that your maximum interior reading?

SPEAKER I think that's an average of the, I think you'd say -it's fair to say it's an average of the maximum temperatures on the interior.

SPEAKER Let's take one more from you Ken, then we'll go to the Cape.

QUERY I was just going to repeat that. That is the max,120.

SPEAKER Let's switch to the Cape for right now, and then we'll come back for a couple from Houston.

QUERY Is there any data on the temperature inside the ATM?

SPEAKER We have been tracking today several temperatures, this was based on a decision as to just exactly when we did power up some portion of the ATM experiments or the ATM thermal control system in order to maintain the stability and flexability to use those instruments as required. As you are probably well aware, normally during the Skylab 1 sequence, at about 3 hours and 11 minutes into that sequence, we do activate the ATM thermal control system. Yesterday when we discovered that we were going to have a power shortage because of the lack of deployment of the AM solar array wings, we elected not to bring on the ATM thermal control system loop primarily from a standpoint of electrical power considerations. And also from the standpoint that we knew we had time, based on exercises that we had done preflight, we knew we had plenty of time to go ahead and make the decision. So what we have done is we have activated today four of the heater systems associated with the ATM experiments - that's essentially one in each quad. And those are presently activated. The temperatures are approaching what we consider to be stabilization limits, and we certainly expect no problems as far as the ATM experiments are concerned.

QUERY You were saying that the average temperature inside the spacecraft is 120 degrees. Do you have a maximum figure, for closer to the spacecraft wall? And secondly, this balloon, what's it made of? Is it made of aluminum or what is it?

SPEAKER As far as what the construction of the balloon is, I do not have that information. I can certainly get the answer for that question, and we'll make sure it is available here, at the PAO office. As far as the temperatures, again, let me repeat, we have started trim plots on various cross sections of the spacecraft on each of the temperatures. And the temperature right now is - as an average gas temperature - it is around

110 degrees.

QUERY I don't know whether this is within your domain, but Conrad was on television. What is the exact status - the quarantine status of the astronauts at this point?

SPEAKER Well they're here in Houston. I have talked with the crew and we went over with them, as have Mr. Schneider and several other people, the exact status of the spacecraft as we knew it and the action items are going on and the crew seems to be in excellant spirits.

QUERY That doesn't answer my question, what is the quarantine status? Is it semi-quarantine, or is it total quarantine, or is it no quarantine at all?

SPEAKER Still in quarantine.

SPEAKER Yes, they're in the same, what is it, medical stabilization program as they were 21 days before the flight. If that is the question that you'd asked. And I'm sure we'll continue to do that until time of launch.

QUERY Barry Case from Huntsville. I just want to ask two things, how certain are you about the accuracy of the temperature sensors in the Saturn workshop? Are you having any more software problems down there?

SPEAKER I think we're fairly certain of the accuracy of our temperature transducers. I should point out to you that in general most of the temperature transducers on the inside of the workshop have a range of around 0 to 120 degrees. So if we get much in excess of 120 degrees, of course we're off-scale high. And we have no real way of telling just exactly how far off-scale high we are unless we go back to the analytical data, and of course this is being studied also in the thermal conference that I mentioned. In general the transducers on the outside of the spacecraft have a range from around minus 110 to around plus 90, plus 290. And of course on some of those temperatures that I mentioned to you briefly that were on the plus-Z side of the spacecraft, we are off-scale high.

QUERY You didn't answer my question about software problems.

SPEAKER Let me take that in three segments. As you're well aware, we depend on the MOC, or our mission operations computer, for our real-time processing. It has been very reliable, we have had no significant problems with that particular computer system. The ASP, which is used for our flight planning, we have had a couple of small intermittent dropouts on it, but certainly nothing of any significance. And all the work that has been required to be done on that particular machine has been done. As far as what we call the mission data retrieval system, or the ADDT system, that system has exceeded our expectations, and when I left the Control Center, we did not have any data back logged, nor had we lost any data. So let me just say, that in general, our ground systems are performing very well.

QUERY Fred Muller, ABC. I get the impression you feel you have precise attitude control and if I understood you correctly earlier, you said- -

END OF TAPE

QUERY Fred Mueller, ABC. I get the impression you feel you have precise attitude control, and if I understood you correctly earlier, you said you'd go plus or minus 30 to 40 degrees off the Z-line, you'd have the temperature problem licked. Do you know yet whether you can fly that without sacrificing too much electrical power?

PUDDY Well, I think you misunderstood me. Let me say that I think we do have precise attitude control. I think that if you - you have an option of course of maneuvering to some degree, to give yourself some flexibility in thermal control, but the statement I made in 30 to 40 degrees on either side of the solar line was with respect to some of the investigations that are being made as far as the deployment of a alternate type shield, had nothing to do with attitude control capability. If we can cover that much area of the spacecraft with some sort of thermal protective shield, then I don't think we are going to run into any thermal problems.

QUERY Maybe my question was badly put. I don't believe in your balloon, therefore, can you fly it in lieu of a balloon, and still get what you want?

PUDDY ... is being investigated, and I do not have the answer to that question yet with me, but I think we can certainly get you an answer on that. Let me say that on all of these investigations there are many options being looked at at the time. Many - all plausible alternatives are being investigated, and I don't think that we are going to have definitive answers on the majority of these questions for you in the next 24 hours. I think we are looking, as Mr. Schneider has pointed out to you earlier today, we are looking towards trying to finalize - we're trying now to gather all the various possible alternatives, and we're looking towards finalizing towards the end of the week on the most feasible and plausible means of going ahead and accomplishing a nominal mission. And I think we're just going to have to be a little patient until the end of the week to have the answers to some of the detail type of questions you're asking at this time.

QUERY Well, nevertheless, you have indicated - I think tonight, that in order to get - your best thinking right now is, in order to get a nominal mission, that you will need some kind of a covering, a thermal covering, be it blanket of balloon, or what have you. And Mr. Schneider indicated this afternoon, that if you have to go that route, it probably mean that it would be unlikely you would get a launch on Sunday. Does that still hold up as you see it?

PUDDY I think Mr. Schneider has certainly been a lot closer to the options on when and if we - or when we would launch Skylab 2, than I have. But I think what he was referring to there is that if you do have to go into design and fabrication of some sort of alternate equipment to provide a protective shield, that it's certainly going to be pushing things considerably to have that particular design and fabrication accomplished. And the key point, the crew trained, and how to deploy that particular mechanism and still make a launch on Sunday, but all that still remains to be seen.

QUERY Can you tell us whether the Conrad crew are taking a direct part in the thermal conference? Up to now, I've got the impression that any EVA would in fact be on the second flight, but now your EVA options do seem to include the first flight, starting Sunday?

PUDDY Well, I don't know that you can say that - unless I'm unaware of some statement that has been made - that there was an intention that the only EVA's would be made on the second flight. As has been pointed out several times, our ultimate objective is of course, is to get as close as possible to a nominal mission, and with a nominal mission you certainly expect to have an EVA operation to retrieve the ATM film. As far as EVA's are concerned, to correct some of the problems that we've noted to date, let me say again that those options are being investigated. I think certainly one aspect is that you do everything that we can here on the ground to train for all the possible options, assuming that we don't have all the data collected. You have various things that you can do and you train the crew in the various options that they can exercise once they arrive on the scene. And you discuss it at that particular point in time and arrive at which is the best way to go. So - I'm not saying that there is definitely going to be an EVA. I'm not saying that there's not going to be an EVA.

QUERY Could you just answer the first part of my question? That was, is the Conrad crew taking a direct part in the thermal conference?

PUDDY Say that the crew is in quarantine, and these various conferences are being held in various places, so from the standpoint of actually participating directly in each one of these conferences - no. In fact there are meetings going on, at least 4 or 5 meetings going on simultaneously in various areas. What we are attempting to do, however, through the flight directors and through capcoms that are working on the console with us, we are keeping the crew involved in the major bullets or major items, decision points that are being arrived at, and each one of these subject areas, and of course, taking any inputs that the crew has, and feeding those back into it. It's an iterative process.

QUERY Jim Sorell, Pacifica Broadcasting. Have any or all of the crew been consulted on the possibility of any EVA?

PUDDY The - I think the crew is aware of the majority of the options that are being discussed. As far as all of the options, I cannot answer that question.

PAO Okay, let's take 1 more question from the Cape and switch back to Houston. Don has been on a 12 hour shift, and we don't want to detain him too long.

QUERY Getting back to this business of a plus or minus 30 degrees on the Sun-line axis, can you give an estimate of what percentage of the total surface area that would be, and secondly, if the crew did succeed in getting a thermal shield over that area, would this conclude turning the spacecraft around to do the EREP experiments?

PUDDY As far as the answer to the first part of your question, basically, what you'd be talking about there is - depending on where the deployment of that particular shield started from, whether we talk about the SAL, or whether we talk about actually doing it from the center workstation, you're talking about something in length in the order of around 42 feet. And you're talking something in width in the order of 10 to 12 feet. As far as whether or not this would preclude doing the EREP experiments, I think this is certainly something that has to be assessed both from a thermal standpoint, and an electrical standpoint. However, based on the data that we have right now, I do not think it would preclude short EREP passes as we indicated to you last night, something very close to, say, 20 or 30 degrees maximus data tape.

PAO Okay, let's switch back to Houston, now. David Salisbury, Christian Science Monitor.

QUERY At this time, do you feel that the crew is going to launch on Sunday?

PUDDY I can't answer that question. I think that as Mr. Schneider has pointed out, that a decision for launch after a review of the options is going to have to be made sometime Saturday, and I think it would be best if we would wait until all the options have been investigated and management has taken a review of those and dicussed all the possibilities.

PAO Kent Beffle, Newsweek.

QUERY Is it just a coincindence that your transducers inside the spacecraft go off-scale at 120, and that also that 120 is the maximum you're reading?

PUDDY Well, it's a coincidence when they go off scale at 120, that 120 is the maximum temperature that we read, that's the truth. However, I didn't say that we were off-scale high on all of the transducers along that line. I said that on some of them that were off-scale high, and on some of them, we were below the 120 degree mark. And as I pointed out several times, what I'm trying to give you here is an average temperature along that line.

QUERY If they are off scale, how can you determine an average?

PUDDY We can't. We can't completely, we're not - -

END OF TAPE

SPEAKER - temperature along that line.

QUERY If they're off scale, how can you determine an average?

SPEAKER We can't. We can't completely. We're not expecting however, that these things - based on the fact that we did make the attitude maneuver and we did bring these temperatures back on scale - we do not feel that they are significantly above the off-scale-high reading, and that is how we are arriving at the average.

QUERY And you brought them all back on scale.

SPEAKER That is true.

QUERY Given your present temperatures, is there any way you can solve your thermal problem without doing an EVA or without having to fabricate something new to correct it?

SPEAKER I think you certainly still have the option of some maneuvering. I think that's about the only other option that you have.

QUERY Pretty well established that you're considering a lot of options and that decision is not going to be made until Saturday. Based on these current temperatures, how much time have you got before you have to do something?

SPEAKER Oh, I think in our present posture now, we have no problem whatsoever in maintaining our present configuration for 5, 10, 15 days, whatever is required. I'm not going to put an outside limit on it. Right now we have a very stable attitude control system. Our coolant loops are working properly. We have taken all the precautions we can to guard all the experiments such as the ATM experiments, to make sure they're operable any time we can get the crew up there to activate them. There is nothing that would preclude us from going on for an extended period of time with the Skylab in its present configuration.

QUERY Could it stand 90 days? Could you operate 90 days? Would that be too long a period?

SPEAKER Assuming no other problems, yes, I think we could operate for 90 days, if we were forced into that situation.

SPEAKER Okay, let's take about two more questions from Houston and end it, if we have two more. David Salsbury.

QUERY Just wondering what you people feel these high inside temperatures are doing to the film in the orbital workshop?

SKYLAB PC-8F
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SPEAKER Okay, as far as film and food and biomedical provisions and things like that, certainly, premission, you establish certain base line temperatures that you don't want to exceed. And as has been true whenever you get into a situation where you are s-ightly off-nominal, you go back and look at the test data that you have on those, and this is what's being done. Again, I'm going to say, until we have the complete results from this thermal conference, I can't give you a specific impact as to what we have in any one of those specific areas.

SPEAKER Okay, Kent Beffel.

QUERY Among the options for a limited mission, is the priority rather high for simply sealing off the workshop and living in the CSM and operating the ATM?

SPEAKER It's an option. I wouldn't say right now that any one option is any higher than any other option. All of them are being looked at and what we're trying to accomplish is to look at these various options, figure out which ones we can do to guarantee - to certainly not endanger the crew, and to gain the maximum amount of mission success.

SPEAKER Okay, thank you very much. Our plans for tomorrow, we'll have a commentator back on shift at the console at 6:00 a.m. and our current plan is to have a change of shift with Milt Widler, who I assume will be breaking some time after 7:00.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

PROGRAM DIRECTOR STATUS BRIEFING
Kennedy Space Center
May 15, 1973
2:00 p.m. CDT

PARTICIPANTS:

William Schneider, Skylab Program Director
Charles Hollinshead, Public Affairs Officer

SKYLAB I STATUS BRIEFING 5/15/73 CST 2:00 PC-7A/1

PAO Okay, I think we're ready to start our conference. I'm sure all of you know Mr. Schneider, he's Skylab Program Director and we'll turn this directly over to him.

SCHNEIDER Thank you ladies and gentlemen. I'd like to - I've been asked to make a few comments amplifying the written statement that we put out on what the current status of the anomaly investigation is. Let me start off by saying that, I'm probably in a poor position to answer any questions you may have about how the inflight mission is going and I suggest that you can get them better from the Houston people at the change of shift briefing. But, I would like to spend some time telling you what is going on in the back rooms and in the engineering organizations. Trying to determine where we are and where we go from here. First, let me tell you some of the activities that are going on down in Huntsville, Alabama, Marshall Space Flight Center where, of course, the center of the hardware engineering is. We're currently engaged down there in some very exhaustive studies of the thermal condition of the spacecraft. During the night we discovered that the thermal condition of the spacecraft was not as good as we had thought it was going to be. When the micrometeoroid shield was destroyed, why it then, also, took with it the thermal paint pattern that was external to the meteoroid shield. And we were relying upon that for the thermal stability of the spacecraft. As you're probably aware, Skylab has basically a passive thermal control system and we depend upon balancing the heat load by paint patterns. This left us with the bare skin of what had been the S-IVB exposed. That skin is covered with a gold foil and the side that was exposed to the sun began increasing in temperature and just after I left you last night, why we found that those temperatures were getting to be excessive and we therefore terminated the pressurization of the spacecraft. We were forced to do this because we didn't understand exactly what temperature we may eventually get - we might have eventually gotten to and with a high temperature the specific kind of aluminum that the workshop outer skin is made of loses a great deal of its strength as temperature rises. And we did not want to get beyond - get to that point when we pressurize. So, we stopped pressurization and took the time out to watch the temperature and get it stabilized. The skin temperature on the hot side seemed to stabilize out at about 225 degrees. We then spent the rest of the night doing - putting the vehicle in various thermal attitudes in order to - in various attitudes with respect to the sun in order to get a better understanding of just how it was going to behave from a thermal standpoint and also from an electrical power standpoint. The two problems that we have, mainly electrical power and thermal have conflicting requirements to maximize electrical power, why obviously, you would like to orient the solar panels perpendicular to the sun's rays at all times; whereas to optimize from a thermal standpoint, why you'd like to put the smallest end forward so that you have the least solar radiation. And, of course, those two are conflicting. So we spent the night balancing between those two trying to see just how we could balance them out and most importantly, providing engineering data for the Marshall and McDonnell Douglas Engineers, to do their mathematical analysis. Now what they are doing right now, is an indepth mathematical analysis of the thermal balance of the spacecraft with in various configuration so that we can try to optimize those two conflicting requirements and get the maximum electrical power that we can while still maintaining a habitable area. That's mostly being done by means of thermal analyses. There are someymall mathematical analyses, computer analyses and there are some small little programs going on, although they're more experimental but mostly its engineers analyzing the data. We are looking at can we barbeque the spacecraft, can we go one rev solar oriented, one rev Z-local vertical, just what kind of orientation to the vehicle can we use to maximize the total output. In the mean time, back in Houston and also in Huntsville the flight support teams are carefully reexamining what we can do in the line of experimentation in the spacecraft and obviously we have to know what kind of orientation we can get before we can really determine exactly what experiments we'll be able to accomplish. We do have quite a bit of activity in again, both Huntsville and in Houston. We've put all of our good inventors to work trying to ascertain if there is some way that we can take action on Skylab 2 in order to do something on that mission, which would then permit us to go up on Skylab 3 with basically an uninhibited Skylab 2 kind of mission. We're looking at, can we somehow or other replace the solar shield with something that will reflect the sun and allow us to get on. In the mean time, down here at Cape Kennedy the preparations are proceeding normally for a launch on Sunday at 11:00. However, with these uncertainties, that I've been talking about, we have decided that we will not be able to give a firm GO or NO GO for launch until we have a better understanding on just what the results of all these engineering analyses will bring, and we anticipate that will be Saturday. So, we've set up our GO-NO GO conference for this coming Saturday, sometime in the afternoon, probably in the 2:00 or 3:00 arena. Gee, I guess it would be best now if I just turn to questions and answers.

QUERY Bill, I've been asked if you would just briefly point out on this primarily for photographers where the problem areas are.

SCHNEIDER Well, the problem areas are that we have - First we started off with the micrometeoroid protection, the micrometeoroid shield being ripped off, probably at maximum Q about 63 seconds and that in some way inhibiting the solar rays. We're not quite sure just how far they are deployed and we think one of them is probably very close in and the other one may be out a little bit further, but we're not sure of that. So, the problem is with the micrometeoroid shield and the two large workshop solar arrays. The ATM solar arrays are fully deployed and in an operable condition. So, that's just where the problem is.

PAO Okay, let's go ahead and start our questions over on this side. Right here.

QUERY Could you briefly reconstruct or explain what the problem is with the attitude control? There's evidently some RATE GYRO problem as opposed to the large control moment gyro?

SCHNEIDER I'll touch that briefly, but, I don't know too much about it. I've been working these other problems. I suggest that that's a good question for the change of shift briefing in Houston. Briefly we have 9 RATE GYROs in the ATM attitude control system and we do a compare. We compare those three - we compare 2 RATE GYRO if they're giving the same answer, we assume that they're right and we use their output into the guidance system. If they're different, we go into a redundancy management mode. We have 3 GYROs in each axis. We then switch from 1 GYRO to another and compare these two pairs of gyros. There seems to be something in the logic that is doing that compare. It does not appear to be in the RATE GYROs themselves or one of them it may be and it may be a matter of their drifting. Our limits may be set too close. We had at least one good GYRO in each axis and - While, it's obviously an area of concern, it's not an area of critical concern.

QUERY What is the roll of the RATE GYRO? What does the RATE GYRO do as compared to what the large control moment GYROs do?

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QUERY What is the role of the rate gyros? What does the rate gyro do compared to what the large control moment gyros do?

SCHNEIDER The rate gyro - the control moment gyro provides the muscle. The rate gyro is part of the brain that senses what the attitude motion is of the vehicle. It senses rate of change of angular motion around the axis of the spacecraft.

PAO Dave, you want to get a mike over here. Jose (garble).

QUERY Mr. Schneider, I'd like to go back to one of the statements you made last night regarding the agreement that you have between yourself and the PAO personnel. The answer that was given to the press colleague was not coming in from the PAO. That we checked. It was coming in from an engineer based on his own experience. May I stipulate on my own here, that the last six years everything I know and was taught - was taught by the PAO personnel either in Huntsville, Houston, in Downey or in Kennedy. When I go home, I can always count on these people. I'd like to make this point now, sir.

SPEAKER I'm sure you can.

SPEAKER We didn't have to pay him a lot for that, Bill. Right down here.

QUERY Bill, is there any way that the guys can go out and fix this, thinking in any way of doing this if it's a simple problem like something being stuck, like the piece of the meteorite shell being stuck in the prow?

SCHNEIDER We, if you mean do you think we can fix the solar arrays, yes, we're kind of working on that but on a low level. We think we can live with the electrical power situation and do a reasonable mission. This thermal question which came up after midnight last night has given us more concern because if we can't solve the thermal problem, why then we've got a very hot spacecraft. And we are working very actively at whether or not we can deploy some sort of a window shade or something that will provide a thermal curtain which will allow us then to stabilize the temperature of the spacecraft and not get hot spots. This then would be something that we are looking at. Whether or not we can do EVA, and I'm not saying that we can't. I am saying, yes, we are looking at it.

SPEAKER Over here.

QUERY Bill, in connection with the solar arrays, has it been considered whether or not a hard dock or even a thrust burn might assist those things out?

SCHNEIDER Yes. That's one of the things that we are looking at. I would not hold great promise to that. We have had some motion to the spacecraft and we have jiggled it reasonably well; if you recall the first occurrence of the rate gyro problem that was alluded to early, we did get a change in motion of the spacecraft. It did not seem to have very much effect.

SPEAKER There is a report that the Skylab crew might go and put this thermal blanket around the spacecraft. What is it? Do you have that in being or would you have to delay further the mission in order to manufacture that? And what extent is it?

SCHNEIDER The answer is right row it's an idea. Somebody said maybe we could do that. We do not have anything like that. If we decide that's what we want to do, I would say it' almos' a sure bet that we would not go on Sunday. We have a long standing policy dictated by experience that when you go EVA you train very thoroughly. And so we would require a great - not a great deal, but we would require adequate training that we assured ourselves that there was no crew hazard and that the crew had a reasonable chance of doing it. That would mean that we'd probably go into the Marshall Emersion Tank and practice the activity.

QUERY Well, as far as the power situation is concerned and not looking at the thermal situation right now, what are the chances of the second and third missions going the full 56 days even though their experiments would be greatly curtailed. Is that a likely thing or just a slight chance?

SCHNEIDER Right now I have to say I can't answer that until we get some more results. It's completely, it's not wiped out 100 percent, but it's not by any means sure that we'll be able to do anything like that.

QUERY Bill, could you kind of - can you give us an idea of the temperatures inside and how far above 100 they are and also at what point you start to really be almost sure you're going to have trouble with electronic telescopes and that kind of stuff?

SCHNEIDER Larry, there is no clear answer as to what the temperature is. If we hold it steady and we reach steady state, our calculations say that the wall facing the Sun can get temperatures up in the 300 - get to be temperatures in the neighborhood of 325 degrees, there about. We have been doing, as I said, attitude management, and we've been going small end forward and facing the Sun. The temperatures internal have been ranging around 90, 82, 77 regime, and we're trying not to let them get too hot. The temperature sensors that had been on the Sun side pegged out last night after midnight and that's why we changed our attitude. So they got very hot, and we changed the attitude and they cooled down.

QUERY Well, I thought that when the temperatures on the outside were 200, they were close to 100 on the inside, if it's gone up to 325, wouldn't that mean the interior has gotten hotter?

SCHNEIDER You've got to say where you are talking about - what point you're talking about, we have no atmosphere in there and we're talking about skin temperature versus the internal skin temperature. And the temperatures internally seem to be averaging about 100 degrees. We have not yet hit 325 - I said our calculations indicated that we would stabilize at 325 if we remained in a solar orientation.

QUERY On that second power, at what point does it affect electronics and your telescopes and such?

SCHNEIDER So far we don't think we're in any trouble, although that's being investigated to see exactly what temperature some of the boxesget to be. As you know, the workshop itself has most of its electronics down in the - down in the lower bay which has not changed its configuration. It's the same. Some of the experiments internally could conceivably get too hot, but we have no indication of anything like that happening yet. We are worried whether or not our food will get too hot. Right now that's working very well. The refrigeration system is holding the food at about minus 9 degrees which is right what it's supposed to be. We're worried about whether or not the film gets too hot in the film valts. The closest thermal sensor that we have is reading - was reading this morning somewhere in the order of 80 degrees, thereabouts, which is less than the maximum allowable. We'd like it to be cool but that's less than the maximum.

QUERY Couple of questions related to the previous one. How low do you think you can get the temperature in the spacecraft with attitude maneuvers? How high would you accept the temperature in the spacecraft before you would launch the crew? And can you use the fans and the refrigeration systems and the cooling systems to make the space station habitable again if you decide you can't use this EVA now?

SCHNEIDER Okay. I'll just comment on the last part and say that the airlock MDA should be perfectly habitable. What we're worried about - what our worry is that we will exceed the temperature on the skin and reduce the factor of safety to an extent where we would not be able to pressurize. Our current indication, and I hasten to state that this is our current indication and calculations must continue. Our current indication is that with the temperature we think we'll stabilize at, the outer skin facing the Sun at 325 degrees, we have a factor of safety of greater than two at 5 psi. From a structural standpoint, assuming we don't find anything different as we go on, we think that's okay. But that would mean that the inner wall temperature would get to be pretty warm, and we would anticipate that the flight crew would have a reasonably uncomfortable trip; so that's why we're looking at whether or not we can get a better temperature profile. I can't tell you right now what temperature we would launch at or what temperature we would consider acceptable. That is one of the studies that is underway. We have the medics looking at what the - what kinds of changes - they are acceptable in the habitation area that would permit us to go up there. We're worried about it from two standpoints; for example, a crew comfort, a crew health standpoint. And then we've also asked the question what would high temperatures do to the results of the medical experiments.

END OF TAPE

SCHNEIDER And they have also asked the question what would high temperatures do to the results of the medical experiments?

QUERY What about the (garble) cooling and refrigeration systems for other purposes. You know you have the cooling of the instruments, the freezing of the food and that kind of thing?

SCHNEIDER If you recall, in the workshop the cooling - The way we cool the workshop is by pumping air from the airlock MDA down through ducts and pumping it on through. That's the only cooling that we have other than the passive cooling that we have, that I mentioned before, that has now dissappeared, which controls the skin temperature.

QUERY Bill, I know you warned us, you don't want to say too much about this attitude control system so, I'm going to make this a general question based on what you did say. You don't consider it's critical, you have at least one good gyro in each axis. Now, the briefing summary this morning, the overnight operations said you may have to change your rendezvous and docking procedures because of this gyro, this thick gyro, what happens to redundancy if your talking about only at least 1 good.

SCHNEIDER Well, that's what I was alluding to. We only have one we've lost our redundancy. We're also looking at the limits that we've set in our redundancy management software, which can be changed in flight. We may have those limits set too narrowing. Also, if its a case that the GYRO is drifting. We can compensate for that. We can put that into the software and software will recognize that the GYRO will have a normal drift in it. So it's something that we're working very actively, but we are reasonably certain that we have A), a workable system right now and B), a system that we think we can get a good set of redundant GYROs on the line very shortly. Primarily there, I would say that that's as much learning about how our new system works as it is a problem. Although, I'll guarantee that the guidance people at both Houston and Marshall are working almost as hard as the thermal people.

PAO Over here.

QUERY In the event that you can only fly limited missions or perhaps no mission at all, what consideration has been given to flying the backup hardware and if it is flown when would that be possible?

SCHNEIDER Well right now we've - we're not trying to bury the patient yet. We're sick and in the hospital and freely admit it. We think we've got a chance of recovering it and I'd say we've got a fighting chance to come out of this with good missions and a good data. In the event that we have to fly the backup our comittment is to have the hardware there in a state where we're ready for launch within 15 months and the hardware is in that state right now.

PAO Okay, I've got one question from Houston. Then we can get some mikes back toward the center here. The question from Houston is from Art Hill. If we decide to hang thermal blankets during EVA, at what time during the mission would this be done?

SCHNEIDER Art, I'm afraid I'll have to say right now, that whole issue is in the why don't you category. We are just in the early stages of asking ourselves whether or not it is even possible to do and we have not yet - we haven't even satisfied ourselves with that question, much less, when we would do it or how we would do it. So, it's a very iffy thing. I don't want to hang anybody's hat on that. I've mentioned it to you merely to illustrate for you the range of thinking that we're going through in order to try to save as much as we can out of this mission.

PAO Okay, thank you. Right behind you.

QUERY I've several questions in view of what the orbiting vehicle may look like, I realize you are not sure, but - You mentioned the gold foil, do you expect that that has been torn away and what would be beneath that a black surface? The next question is, do you have any information that would lead you to think that the BOOMs have deployed partially and the panels have deployed not at all? Or the BOOMs have deployed completely and the panels are jammed? And lastly, I understand that there is a very powerful camera down here at Patrick which the Defense Department owns. Have they shown you pictures of the vehicle taken by that camera?

SCHNEIDER Okay, let me - The last one as I remember first, no I have not seen any pictures out of any camera. I've seen no pictures out of any place, and I don't believe any exist. The configuration of the vehicle, the gold foil, is probably pretty much intact. That foil is epoxied to a aluminum surface. It's aluminum, then epoxy, and the gold foil is on that. I would guess from just from postulating what probably happened that gold foil is probably scuffed and probably peeled off in places, but I would guess that most of it is probably still there, although obviously I don't have any way of telling that, and that's one of the things we hope to do on the mission. The third question, as to what the position of the solar panels is, is that it appears as if both solar panels have released, that is they have separated from the side of the workshop. Neither of them have fully deployed, because we do not have a fully latched. We think - from the instrumentation - we think one of them is very close to the side. We think one of them is a little bit further off, but we are not quite sure we believe the instrumentation, because one of them says that the inboard wing is further deployed than the outboard wing, and that kind of says that maybe there might be something wrong with the instrumentation. So, I just told you all I know about what the configuration is, and I recognize it it isn't very much. One of the things that I guess I should make sure all of you ladies and gentlemen understand is, we at NASA have gotten very used to the Apollo kind of mission, where you've got data continuously, and without interruption, and then real time. Skylab is back in the Gemini Mode, and our data comes in only in real time when we are over a ground station, and that averages about 20 percent of the time during the day, average over a day. The rest of the data is recorded on an onboard tape recorder, and that is dumped at the remote sites, and subsequently pumped into Houston where it is processed through the data processing systems, and then displayed. We normally see, if everything is working properly, we normally see the dump data approximately an hour and a half after a station pass. So, for things that happen between ground stations, we're just as blind as everybody else for an hour and a half, and sometimes as long as 2 hours, depending upon how busy the computers are. So sometimes our data, our examination of the data, falls behind a little bit and we have to intergrate in the real time data with the dump data to try to understand it.

QUERY What's beneath the gold? Is it black?

SCHNEIDER No, it's a metallic surface. Aluminum. Sometimes it appears as if we're not quite sure exactly what our telemetry signals are telling us. Sometimes we're not, and it takes us a little time to sort them out and to put them in their right perspective, and be able to understand and analyze them.

PAO Okay, Mr. Schneider has to catch a plane, also, we do have some questions from Houston. We'll switch to Houston and get some quick questions from them.

QUERY David Salisbury from the Christian Science Monitor. Mr. Schneider, did I understand you correctly to say that if the Skylab was pressurized, and if the heat exchangers were working, that there would still be a problem of surface temperature? And the second question, did I understand you correctly to say that there was only one moment gyro operative in one of the axis?

SCHNEIDER No, we we're not talking about the control moment gyros. We were talking about attitude rate gryos, of which there are nine of them. We have had indications of excessive drift or something that is causing our logic path to fall down. We know we have at least one good rate gyro in each axis, at least one, we believe we have only one that is a problem of the entire nine, we think the rest of them it's just a case of getting our logic down straight. As far as the temperature is concerned, yes, without the meteoroid shield, we have no -

END OF TAPE

SPEAKER - we think for the rest of them it's just a case of getting our logic downstream. As far as the temperature is concerned; yes, without the thermal - without the meteoroid shield we have lost our thermal pattern and if we remain in solar orientation the spacecraft side pointed toward the Sun does get hot, excessively hot, and therefore we would be forced to go into attitude - take attitude changes to reduce the temperature. We're looking at a number of those including (garble) the spacecraft, going into V-local vertical radially offsetting ourselves in Roll, Pitch or Yaw and we've not determined which one of those gives us the most optimum combination of electrical and thermal characteristics.

SPEAKER We'll take one more question from Houston and then we're going to have to knock it off and we'll try to get any answers to your questions in the News Center. Go ahead.

QUERY This is Bruce Hicks with UPI. Bill, is there any real possibility that the thermal problem can render the orbital workshop uninhabital?

SPEAKER Yes, one of the things we're worrying about is if we remain in solar orientation and do get the spacecraft too hot there is a possibility that some of the materials inside would outcast giving off CO and CO2 and other things that are undesirable, and giving us great problems. That's one of the reasons that we do not want the spacecraft to get too hot. Right now at this point, and it may change drastically in the next few hours, at this point we think the thermal and electrical problem will severely curtail our activities but not stop them.

SPEAKER Thank you very much.

END OF TAPE

SKYLAB 1
JSC NEWS CENTER
HOUSTON, TEXAS

Skylab Press Conference
8:20 A.M. c.s.t.
May 15, 1973

Participants:

Neil Hutchinson, Flight Director
Jack Riley, PAO

PAO Okay, we have Flight Director Neil Hutchinson, who has just come off shift after watching the orbital assembly all night. We'll start with a summary of his shift, and then we'll take any questions you might have. Neil.

HUTCHINSON Okay. I came on last night about midnight and finally got to work about 1:00 or 1:30. Just to give you a synopsis of what's going on in the workshop, we've pretty well got things settled down, I think. If you can call condition ... settled down. Last night we ran a couple of special attitude maneuvers for the purpose of obtaining temperature data on the cluster. We ran one revolution with a plus-X axis. That's the nose of the spacecraft, where the CSM goes in, pointed at the Sun. In other words, minimizing the surface of the vehicle that was exposed to the Sun. And we spent one revolution in an angle 45 degrees from that. In other words, if my hand is the Sun, we spent one revolution with the spacecraft pointed right at the Sun like this and one revolution with it canted 45 degrees to the Sun line. The normal orientation, of course, is to go around perpendicular to the Sun line. We did get a lot of the temperature transducers that have been reading off-scale high back on scale with our attitude maneuver, and the data has been passed to Huntsville and currently is being analyzed there in some thermal programs - some large computer models that we have of the thermal system of the vehicle. We don't have the results back yet, and I expect them sometime this morning. Let's see. Some other significant things last night. We continue to have trouble with computer management of the gyro system in the APCS. We again last night had the computer call a gyro bed and pull it off-line. Well, they didn't pull it off-line; it never did load it as a bad gyro, but it did bring the third gyro and the axis up. It was in the X-axis this time. It's the third time it's happened. It happened right over a site. We had real time data and we have analyzed - we looked at the data very carefully and decided that the computer made a bad decision. We have put the gyro back on the line and re-enabled redundancy management. And the problem is in work, both here and in Huntsville. And it could be software, it could be hardware. It could be the interface between the machine and the hardware. It's still a completely open problem, however. The vehicle behaved well last night during the maneuvers. We ran them under TACS control only. As you know, we have inhibited CMG controls since yesterday. However, this morning, just before I left, we have put the CMGs back on the line. We did that about an hour ago or so. And we put them back on the line with the momentum dump inhibited. In other words, they won't get rid of unwanted momentum. The reason we did this was because we're not sure what's causing the redundancy management to call these gyros bad, and we don't want the vehicle to maneuver until we understand some more about that problem. And, of course, to get rid of momentum requires a maneuver; so we have inhibited momentum dumps for the time being. What that really means is that we'll go about 3 or 4 revs without spending any gas at all and any TACS propellant at all. And then we'll spend a minimum amount staying out of saturation. It's a much better condition than we've been flying in the last day and a half where we've been on the TACS only, using a lot of propellant. Not a lot, but more than planned. Power system is performing. The ATM portion of it is performing completely nominally. We took the batteries down to about little better than 50 percent state of charge last night in the process of doing these two abnormal attitude maneuvers or out of solar inertial attitude maneuvers, and it responded properly. When I left there this morning, I don't recall, but most of the batteries were back to 100 percent state of charge at the end of the last Sunlight cycle. Oh, about the CMGs - I guess that's probably - probably - Oh, one more noteworthy thing. The IU finally died at 18:46 phase elapsed time. That's elapsed time since lift-off. That's about 12:15 Zulu this morning. That's well beyond what we could nominally expect out of - life-time out of it, of course. We are watching the thermal situation on the telescope mount, itself, fairly carefully. It is slowly, but surely, cooling off. The two maneuvers we did last night slowed down the cool-off rate, but it looks like probably - oh, 15 to 20 hours from now, we're going to have to turn on the instruments. We're going to turn on one instrument in each quad to preserve the thermal balance. That's about it for last night. The vehicle is now back in solar inertial and just going around cooking, and we're working on the thermal situation and, of course, the mission plans. Last night we spent most of our evening - I - My particular shift and my team did essentially no work on the planning of how we're going to get from here to there. We spent our time working with the vehicle. So I open it for questions, most of which I probably can't answer because you're going to want to know what's going on with the CSM launch.

QUERY No, I'm not going to ask about that, Neil. I want to know more about the thermal problem. And am I correct that the thermal problem is basically caused by the lack in the meteoroid shield?

HUTCHINSON I guess that's the current theory.

QUERY Based on all the maneuvers in (Garble) that you did last night, how would you estimate the possible efficiency of the rest of the flight on a thermal basis?

HUTCHINSON Well, I think it's real hard to say, Bruce. It's obvious that the vehicle is hot. And it's hot inside. I really think we need to wait for the - some of the thermal analysis to come back from Huntsville. As you probably know, we are dependant upon them. The big thermal models are up there. They, of course, have had effectively no data to put into them until we did these maneuvers and got some of the transducers to read because they've all been off-scale high, which, I think, for a lot of those outside ones is like 180 degrees, something like that. The temperatures that we see inside the cluster - we see temperatures like in the Florida experiment compartment in the area of 100 degrees or so. It's plenty warm in there. I don't recall how much they change. The two revs that we spent out of solar inertial, but I'll remind you that we didn't do that to try and cool the thing off, we were just trying to get some temperature - gather some temperature data. As far as being able to manage the thermal situation, I really don't know. It's just too early, yet, to tell whether we're in an unmanageable situation. I wouldn't say that at all. I'd say we've sure got a lot of looking at it to do, and it is a problem, there's no doubt about it. I mean the cluster's hot. And we're going to have to figure out some way to cool it off. We've got, of course, some heat exchangers in there. We have one heat exchanger in the OWS that I think is worth a couple of thousand BTUs; we have one in the airlock that's - -

END OF TAPE

SPEAKER - it's worth a couple of thousand Btus. We have one in the airlock that's about a thousand Btus of heat removal capability. They cool the air in the vehicle. And other than passive thermal coatings, which of course, as you know the meteoroid chill problem we've had has caused us considerable problem - That's all the thermal control capability that we have except for attitude maneuvers. And the problem with attitude maneuvers is as soon as you start messing around with the attitude you lose the Sun and we're short on electrical power. So I don't have any answer for you. It's a problem of primary concern.

QUERY You answered part of my next question with that, but you said you didn't recall how much change you had during the attitude maneuvers, say when you pointed nose in. You of course lost almost the total ATM solar panel usage as far as getting anything from the Sun.

SPEAKER A hundred percent of it. It was exactly - if my hand was the panel, the Sun's rays were coming like this and we had no production of power. Relative to the Sun while we're in that attitude we're on the batteries completely.

QUERY Well, did this maneuver do you think substantially help cool off the vehicle or could help cool off the vehicle?

SPEAKER Well, let me answer that this way. In the short term, probably yes as a function of a lot of the temperatures on the outside. As far as cooling off the whole vehicle - probably no, because thermal balance is a long term, slowly responding thing. It takes the vehicle a long time to heat up to the kind of temperatures we're seeing, and it takes it a long time to cool it off, and keep it cool. In other words, what I'm trying to say is, for an example, some of those temperatures - skin temperatures which are not directly exposed to the Sun, which are between layers and I'm not sure where they all are, a lot of those that have been pegged off-scale low came down into the say 90 degree range in a period of an orbit - were pegged off-scale high was like 180, I'm not sure what the range is, but upwards of 200 degrees. So, like they dropped 100 degrees in an orbit, but if you turn right around and put the thing back in solar inertial and in another half a rev they're right back up there again. Now those kind of temperatures are not indicative of the thermal condition of the vehicle, because it's just like you take a metal rod and put a 200 degree flame at one end of it, and it takes it a while to get down to the other end until the whole rod is up to anywhere near the temperature of the flame. The real problem we've got with this thing is how to control the total thermal environment, not the short term type of thing. And I really - I personally - I don't know - but it's my feeling that attitude maneuvers aren't the answer.

QUERY The meteoroid problem - what was -

SPEAKER No, I don't have any new data on the meteoroid shield. Whatever was passed out yesterday, in fact I left here about 4 o'clock yesterday, and I'm not even sure what they finally decided, other than it probably is not totally intact and is undoubtedly responsible for some of the thermal problems we're seeing. It's around the back end - the big part of the vehicle - the big tank that goes around the whole circumference.

QUERY Neil, those temperatures are Fahrenheits that you're -

HUTCHINSON Yes.

QUERY And how would you characterize the total environment right now?

HUTCHINSON In the vehicle?

QUERY Yes.

HUTCHINSON Houston on an extremely hot, humid day.

QUERY What is producing the humidity in the spacecraft?

HUTCHINSON Oh, I meant that to emphasize that there's no - in fact, as a matter of fact, I suspect that's another thing that we're going to have to chase. I think that the vehicle - probably we're going to have dryness problems in there. Because it is so warm, it probably is extremely dry.

QUERY Neil, last night Gene kind of read the riot act for a few people who said you're making this sound like a post-mortem. And he exuberated great confidence and good will and cheer that the mission would carry on. And yet this morning, you kind of read like a postmorten on Skylab. What are your feelings?

HUTCHINSON I don't mean to read like a postmortem at all. Maybe I'm tired because I've been up a lot. We've had a serious anomaly and we haven't figured out yet how to cope with it. I don't mean to lead you one way or another and I think that the next couple of days we've got to solve this thermal thing, we've got to figure out how - what kind of a mission we're going to fly, because we don't have all the electrical power we need. And so that's going to require some curtailment - we haven't figured that out. We're going to have to figure out how to get the vehicle turned on in a state that we have never practiced before, so there's a lot of big dittys to get done between now and then. Let me make a positive statement about - I have not seen a show stopper yet.

QUERY Well, when you mention about these temperatures inside and you start talking about air conditioning equipment, which consumes a total of 3000 Btus against this power curtailment, it certainly leaves the prospect that if the astronauts can go up there at all they will be sitting there in the dark maybe looking out the window and that's it. They won't even have enough to crank the ergometer.

HUTCHINSON No, I don't think it's that. The power problem is not that signficant. Of course, the fact that we don't run the cluster full-up powerwise helps the temperature problem inside, because you're not producing as much heat. We have better than half our power producing capability. I guess - I don't remember - recall what the ratio is, but it's something like 55:45 in favor of the ATM as far as pure producing capability goes. That's plenty of power to run the workshop and make it habitable. However, you're not going to run it wide open with the ATM and the EREP going and that kind of stuff. I really don't have any numbers on the kind of curtailment in flight plan activities that we're talking about. But we certainly are going to be able to get a meaningful amount of data I'm sure.

QUERY Two questions. First, I understand that really detailed thermal balance studies were not made on Skylab prior to launch. I was just wondering whether this is hindering the Marshall people and their modeling. And secondly, do you have available the total power inputs necessary for the different types of different experiments?

HUTCHINSON Well, let me answer the first question. I don't have any first-hand knowledge of all the thermal analysis that was done, but there have been a lot of thermal analysis done on Skylab, and most of it was not done here. Most of it was done in Huntsville. That's how we got the models. They were built up over a long period of time, and of course, that thermal constituency of the vehicle relative to heaters and air conditioning, air cooling equipment and paint, and as you know there's a big thermal paint pattern, or was - there's a big thermal paint pattern around the workshop, all that stuff is all a result of intensive thermal analysis. Now the fact of the matter is, the one thing that - The OWS was not put in a thermal vacuum chamber and subjected to a - if you will - a realtime thermal test with simulated solar and real vacuum and so on and so forth. And that is one thing that is - one piece of data that we don't have on this vehicle. Of course there was a reason for that, it's too big. But I think, as far as the analysis goes and everything, I'm sure it was all done. Secondly, we have all the data that we need to determine how much an experiment costs in terms of power and so on and so forth. It's a matter of putting it together and getting a balance. And the proper balance is probably going to take quite a bit of time to understand what it is we ought to be running at one time and what we hadn't ought to be running. And we have computer programs here in Houston in Mission Control Center that allow us to manage the power fairly effectively, built for just such a case.

QUERY What is the temperature inside the spacecraft?

SKYLAB PRESS CONFERENCE 5/15/73 8:20 CST PC6C/1

SPEAKER To give you an example, a couple of structural temps, and I looked at them just before I left because I've kind of been chasing them as we went through these maneuvers. In the experiment compartment that's downstairs on the ceiling, on the grid around 100 degrees when I left. About in the - I think they're located sort of in the middle of the room of the cylinder.

QUERY Is that example higher or lower than the other ones you've seen, or is that a real good average of what you've seen inside?

SPEAKER I - It depends an awful lot. And it's obvious that it depends on which side of the bird you're on. Let's see the sleep compartments are on - well they're toward the Sun side. More or less they're in that quadrant - one of the quadrants that's toward the Sun, and they're right next to the wall. And I recall seeing some temperatures in there about 100 and some odd degrees or something like that. Oh, don't hang on my numbers. 100 and - 100 plus - right there in that area somewhere, 100,p105. And so what I'm telling you Bruce is that it varies a lot depending - depends on whether the doucer is - on the metal, whether it's next to the skin, whether it's inside. But it's hot in there, it is.

QUERY Do those heat transfer mechanisms and everything that can help cool it down, cool the air and all. What kind of power does that pull in terms of wattage? Do you have any idea?

SPEAKER No, but let me tell - let me tell you a little bit about them. They're basically heat exchange mechanisms. So what you're doing - the kind of power you're consuming is to blow air across them. And so you're pulling power for a fan and, for example, the OWS heat exchanger when operating in a full cooling mode has 4 fans going and of course, you have to run the pumps in the coolant loops to keep the rest of the electronics cold anyway. So you're not spending any extra power for the - the - for - to run the coolant through the heat exchangers. So basically it's - the cost is the cost of running the fan which is not - certainly not any big user. Not like having to turn on the heat, like turning on the radiant heaters or something.

QUERY With everything nominal, what would the temperatures be inside the spacecraft at this point?

SPEAKER I guess I'd expect it to be probably in the 60's or 70's in that area. We don't have any active air circulation; so the amount of temperature stabilization you get from air convection is - there isn't any right now. And we of course, had planned I believe and I - frankly I didn't have - I only had one shift on this mission, nominally before the crew got there; so I'm not sure but I think we had planned on using the radiant heaters which are the big wall heaters, a few times in the workshop. So we plan at this point, on being, or yesterday, on being in a posture where we probably had to add a little heat to keep the temperature in the 50/60/70 degree range.

QUERY Is that all the result of the absence of the micrometeoroid shield, or is there something else involved?

SPEAKER No, as best I know, that's the only known - that and whatever other degradation has happened to the thermal coatings of the outside. Or the only known contributors to our thermal situation.

QUERY You say that you're not getting any air convection now. Do you plan to turn on any of these fans to see if you can bring down the temperatures inside the spacecraft?

SPEAKER No, we - There's nothing in the - No reason to worry about the temperatures inside the spacecraft until we're concerned with crew habitability. And, of course, prior to that time, we pressurize it up, and when they get there, that's the first - We don't turn them on from the ground. The crew turns them on when they go in there and - so they'll be doing that.

QUERY Will the temperatures continue to rise? Or -

SPEAKER I don't know whether we've - I can't answer that question directly. I don't know if we - The thermal situation - the answer to it is probably yes but nowhere near as fast as they are - as they have been. And that's because thermal problems again are long term problems, and you know you'd have to fly that thing around in a constant attitude for a week for it to get to a stable temperature. But the curve looks like this. You know, it goes very steep at first, and then it flattens out slowly; it begins to rise slower, slower, and slower until it reaches some equilibrium point. And I'm sure we haven't gotten to an equilibrium point yet. But as far as how much, it certainly won't be anywhere near the kind of drastic rise. You've seen the worst of it.

QUERY Now to come back to your computer problem. What does that affect? Does that affect attitude control system or what does it affect?

SPEAKER Yes, it doesn't directly affect - yes it affects the attitude control system. The anomaly we've been seeing though is a pri- is a problem in attitude control system where - you know, the attitude control system has a bunch of routines in it where it diagnoses its own health. And it's not doing a very good job of diagnosing it's own health because it's calling itself sick when it isn't, is what it amounts to. We do have one gyro and one axis that is not healthy. Really it's not looking good.

And it caught that one too. But the other that's in the Y - the number 1 gyro in the Y-axis. The effect on the attitude control system - These gyros, you know - The Skylab doesn't have an inertial platform. It keeps its ability, its inertial reference in a computer. It's just a fictitious thing, really. And it uses sensors to figure out how to stay inertial. And one of them looks at the Sun, and, of course, you can't see the Sun all the time. And when you can't see the Sun, it uses these gyros that I have been talking about to figure out - it measures its attitude deviations and uses the gyros to figure out where it is relative to an inertial reference. And the gyros, like I said, there is only one of the gyros out of nine that has looked - looked not well. And these other ones - we have three of these gyros in each axis, triply redundant. The system will work on one. It likes to have two because it likes to average two, and then, of course, if it has three, it can automatically vote the three, one against the other. And when it decides that it has one that it doesn't like, it brings up the third gyro and then votes two out of three volting logic and decides which one is sick and turns it off. Designed to work without human intervention except when it does what it's doing now.

SPEAKER Are there any questions at the Cape?

SPEAKER Okay, thank you very much.

SPEAKER Okay.

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SKYLAB 1
Kennedy Space Center

SKYLAB 2 MISSION SLIP PRESS CONFERENCE
May 14, 1973
10:00 PM CDT

PARTICIPANTS:

William C. Schneider, Director, Skylab Program, NASA Hq.
Walter J. Kapryan, Director, Launch Operations, KDS
James Kingsbury, Deputy Director, Astronautics Lab., MSFC
Leland F. Belew, Manager, Skylab Program, MSFC
Don Puddy, Flight Director
Eugene F. Kranz, Chief, Flight Control Division, JSC
John McLeaish, Chief, Public Information Office, JSC

SPEAKER and will be open on a seven to seven basis, rather 7 a.m. to 7:00 p.m. basis for the rest of this week. Okay, can you bring that up a little bit in the back? I'll try to speak into it. We'll be open to approximately midnight tonight. I understand that we have Western Union support. Here in the News Center, following the press conference, for the rest of the week we'll be open from 7:00 a.m. to 7:00 p.m. On my right is the Director of Launch Operations here at Kennedy Space Center, Walter J. Kapryan. To Mr. Kapryan's right is the Director of the Skylab Program, William C. Schneider. And to his right, Mr. Leland F. Belew, manager of Skylab Program for the Marshall Space Flight Center. Mr. Schneider.

SCHNEIDER Good evening, ladies and gentlemen. Just to get right into the incident - at approximately 63 seconds into the launch of the Skylab 1 this evening, there was an indication of premature deployment of the meteoroid protective shield. That is the lightweight metal shield that is designed to sit off - few inches from the skin of the Skylab. There was an indication of premature deployment of that. If that had happened, the shield would most probably have been torn off in some manner. The shield does not appear to be on at this time. The thermal indications are that it is gone. During the separation of the meteoroid shield it had apparently had some - I will say, I'll speculate that as a mechanical effect on the deployment of the solar array. And we have some indication that our solar array on the workshop - those are the large solar arrays not the cross solar arrays - that the large solar arrays on the workshop also did not fully deploy. We have indication that they have - that deployment has initiated on those solar arrays, but we have no indication that they have fully deployed. We are getting some electrical power through some of them, however. As a result of that, we've assessed our situation and decided that it would not be prudent to launch tomorrow as had been planned, and we have rescheduled the launch of Skylab 2 for Sunday, appoximately 11:00 eastern daylight time, again with about a 10 minute window. We will spend the time from now until then in developing a flight plan that will maximize our scientific return. With only one set of solar panels deployed, our electrical power output is roughly cut into half, and that of course would require some reassessment and probably some curtailment of our mission activity. We are fortunate in that some time ago we made the decision to bus in the command and service modules power for as long as we had cryogenics on board, and so we will operate in that mode most probably such that we will share the power from the command and service modules and the ATM, which is up, and thus have a maximum of power available. Unfortunately, being limited by cryogenic fuel capacity, it is expected that that - those cryos will run out in anywhere from 16 to 21 days and from then on we would have to run an even more curtailed mission. So it looks as if we will have a flight plan that will require some revisions in the content of the flight plan. It is my intention to kind of assess all of the experiments a little bit. We will reduce a little bit of our medical experiments, probably our EREP experiments and our ATM experiments as well in order to maintain capabilities that go within the power profile that we have available. We have not determined precisely which of our experiments will have to be curtailed or just how much they will have to be curtailed, and will not be able to do that for a couple of days. As far as what the effect of this activity will have on subsequent missions, I'm afraid it's too early for us to assess. There are many options that are open to us. Obviously we couldn't, assuming we are successful in running the 21 day mission and don't run into any other trouble, we obviously could run some more 21 day missions. That has not been decided, it has not been ruled out, it hasn't been decided. Other options might be back - to - back 28 day missions, which might extend the time a little bit longer, and things of that nature we have not determined other than we can't make any comments on them at this time. So I guess I've answered all - -

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SPEAKER I guess I've answered all the questions I think you have on - - all open questions at this time are obviously what effect these incidents will have on our system. We have open questions, not only in the electrical power system, but also in the attitude control systems, and in the thermal system. And we will require some time to see how the systems stabilize to see exactly what configuration we are in. At this time, we are preparing to launch at 11 o'clock, eastern daylight time, on Sunday. I'm afraid I don't know the date, but that's Sunday, ... that's the 20th. Leave it to the launch director to know the date. Thank you.

PAO Okay, for your questions we do have standing by in Houston, also, Don Puddy, Flight Director, and Gene Kranz. Please, if you would, it's going to be trouble to get mikes to you, but, if you would wait for the mike. Okay, let's start over here and just work our way around. In the blue shirt over here - -

QUERY There was a report earlier that the attitude control system apparently wasn't working correctly; that the gyros were not functioning properly. Is this true, and if it is, is this a result of the decreased amount of power available?

SPEAKER The answer is yes, there was some incident on the attitude control system. I do not believe it had anything to do with the electrical power situation and perhaps Gene Kranz or Don Puddy might want to amplify that.

PAO Okay, let's stand by for a minute to see if Houston wants to amplify that.

PAO Silence is golden.

SPEAKER Electrical power, as you all are probably well aware, when we start out, we are in the process of spinning up the CMG. And before we lifted off, we knew there were certain things that might be a little unknown in this area, and we were going to have to feel our way along. We feel that there are some of the problems that are associated with the rate gyros that you've heard reported, that may be associated with these low CMG wheel speeds. We're right now around 4,000 r.p.m. We are in a - -

PAO Houston, we lost you right toward the end of that.

PAO Houston, can you come up again with the finish of that statement?

SPEAKER Have you got me now?

SPEAKER Do you have me now?

PAO We have you now.

SPEAKER Okay, we are in the process right now, of course, continuing to spin up the CMG's. They were brought on line when we brought the APCS on, 1 hour and 37 minutes into the mission. The wheel speed presently is around 4 to 5,000 r.p.m. and, of course, full CMG wheel speed is around 9,000 r.p.m.

Basically, what we have is that, of course, there are nine rate gyros, three associated with each axis. Right now our problems have centered around the Y, or the pitch-axis, and the problem we've been having is that we've been failing what we call redundancy management. And, basically, this is a routine that the computer goes through to check and see whethor or not we do have agreement with the rate gyro outputs. In general, we have 2 rate gyros on line in each axis and the outputs from these rate gyros are average. When you hear us saying things like, "We have failed the redundancy management," what this means is that there is some reason the computer thinks that those rate gyro outputs are not comparing, and we essentially fail over to a single rate gyro method of control. And, in general, this means that rate gyro number 1 is controlling and rate gyro number 2 is essentially on a backup or standby capability. We are no longer averaging those two outputs. I think we are in the process right now of still assessing the data from the indications that we've had today. We presently feel that there is no problem, and let me also say that the problem that you have heard about, has occurred only in the Y-axis and I feel certain that within a few short hours we will have some solution as to the problem. One thing that we're looking at specifically right now is the fact that when we do fail redundancy management, the - one of the schemes associated with the redundancy management is to take a look at our momentum state. And since we are at these low wheel speeds, any error that we might have had in the computer, prelaunch, as far as the expected momentum state that it can use as a test constant, could effect this. And so this is one thing that we're looking at very hard, but we certainly do not consider this to be a major mission problem at this time.

PAO Okay, Fred Muller.

QUERY I just want to follow that up with 2 questions. One, that sounds like you're very confident there's no danger of tumbling, and secondly, it kind of eliminates the possibility you may have from other mass you may have floating around in the back end of Skylab, that you didn't expect because of vibrations.

SPEAKER Well, I would have to say that, yes, I don't think, right now, that we are concerned about the vehicle tumbling and, no, we know of nothing as far as the mass state of the vehicle that says that we have a different moment of inertia, or anything of this nature associated with the vehicle that was not expected

PAO Okay, let's move on back - the brown suit back there.

QUERY Two part question - Do you think that in the present state of the spacecraft, you can now satisfy the primary mission requirements? Number one. And number 2, what concern have you given for the safety of the astronauts in the experiment configuration of the spacecraft?

SPEAKER Well let's answer number 2 question first, because that's the easiest one. That's always our prime concern. We have examined the system very carefully and, at this point, know of no safety hazzards to the crew in any way, and, obviously, if we do uncover any safety hazzards, it will seriously affect our ability to go up and man the mission. We know of no holes in the spacecraft or anything like that. As far as the second part is concerned, I mean the first part, which I'm answering second, the primary objectives were to get into orbit and establish a space station, conduct experiments, and get medical data. We will do all three, I believe, assuming we do lift off next week. We will do all three, but we will do them a little bit differently than we had hoped to. The space station will have a little bit less optimal configuration in that we will not have as much electrical power. We will have to curtail our experiments somewhat, and in what way, I really don't know, and we probably - some of the experiments that will be curtailed will, in all probability, be some of the medical experiments.

PAO Okay, here in the yellow.

PAO If you would direct your questions, please to the person, it would help with ...

QUERY Mr. Schneider, there is a report floating around here tonight that NORAD has been tracking some objects or debris floating in the area of Skylab. Do you have anything on that?

SCHNEIDER Well, one would expect that there are things in the orbit. We did eject our solar panels; we have an S-II stage up there; we have various covers and things like that. I would not be surprised that they were tracking objects. We have no indication that we have lost our solar panels. It's perfectly conceivable, but it appears as if we are getting electrical power. We think the solar - the micrometeoroid shield, we think that went around max Q. And if that's so why it never even got close to being in orbit. There's no indication that the spacecraft has broken up.

PAO Okay, let's get a mike back over here, please. Back over to this side.

QUERY I'd like to direct my question to Mr. Belew, if I could. Do you envision, in the schedule EVA toward the end of the original 28-day flight, some sort of visual inspection of the solar panels and any correction by the astronauts of the problems?

SPEAKER We would plan, at the very beginning of the mission, during the pre, or prior to docking, to do that from within the command service module, by stand-off or - -

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SPEAKER - to do that from within the command service module by a standoff or circling around, the photography as well as visual. So we'd hoped to do that by this means rather than to do an EVA just for that purpose.

QUERY I have a few questions for Bill. Does this mean maximum mission you can fly is 21 days, you can't go 28? Does it also mean the end, are there any hopes for the 56 day mission? And the second question is what does ... meteoroid shield mean?

SPEAKER Okay, the answer to the first two parts of your first question is no - I'm all right, this isn't on. Twenty-one days is not what we have determined to be the limit. We think that we will have, looks like about, well we guess from right now, looks like about 5 kilowatts of power to play with for 16 to 21 days. Beyond that we probably only have something on the order of 4 kilowatts of power. We can't really say whether or not that's enough or not enough until we see how much electrical power the systems end up using. We think we will be able to do a mission - right now we think we will be able to do a mission of 28 days. But the last days after the fuel cells have run out would be much more curtailed. We'd have to use about - I believe the number is about 1200 kilowatts - 1200 watts - to power up the CSM. So if we ended up doing a 56 day mission, the last part of a 56 day mission would undoubtedly be very very curtailed. That does not rule it out, nor does it say that we'll end up doing it. We haven't really determined that. And let's see, the second question was - The micrometeoroid shield was placed on there as a mission success tool, not to - not for a crew safety standpoint. When you put a spacecraft into orbit, you play the probability game and you decide what probability there is that you'll have a micrometeoroid penatration. By having the micrometeoroid shield on there, we reduce the probability that we would get a small pin hole puncture which would - which may cause us to use up excessive - excessive oxygen and nitrogen. So, if we did get a micrometeoroid penetration, it would reduce our capability to stay up there, but you can't say how much until you get one.

QUERY For Bill Schneider. You reduce the probability from what to what?

SCHNEIDER I don't know from what, but let me see.

SPEAKER Well the numbers would be from a 997 to a 990. Something like that.

QUERY Out of a thousand?

SPEAKER Yes.

SPEAKER Okay, right next to him, in the yellow.

QUERY Could someone tell us, Houston perhaps please, what the astronauts will be doing in the next 5 days? Is there any consideration being given at all to some sort of EVA, to remedy the solar panel position?

KRANZ This is Gene Kranz. One of the major things we're thinking about doing over the next couple of days is to look at some of our launch rendezvous and activation procedures. One of the things that will possibly have to change, associated with the rendezvous - normally we pitch over to Z-local vertical to allow the crew to track the workshop more easily, and it provides a better tracking target. And they can also see the flashing lights that are set up for crew visual tracking. At the current time, we don't feel that we'd like to perform that maneuver again, because if we perform the ZLV maneuver we'll lose our solar array output power, and we'll be working, essentially flying, the entire workshop off the ATM battery. So, that's one of the items that we'll be looking at with the crew. Another one of the items - in order to extend the CSM duration as far as possible - and Bill one of the corrections on that - at the present time it looks like our CSM capability with cryos is more in the order of around 17 days as opposed to the 21. We're going to be looking at ways to minimize the CSM usage of these cryos, to see how far we can extend the CSM cryo capability beyond that 17 days. I believe the majority of our time is going to be spent looking at the procedures we used for launch rendezvous day in the 3 days of activation to see if there is anything we can delete, so we can get the crew into experiment activities as soon as practical.

QUERY I have two questions. First of all why weren't we told earlier that you had a serious problem with the shield? It is my recollection that we were told that the shield had deployed, that we were told that it was partially deployed, now we're told that it's no longer there and we had a problem early in the flight. Secondly, I was told by KSC officials and from Houston people that the shield was mandatory, and without it, if it wasn't deployed, that they would have to, you know, cancel out. And that was during the time that they were having problems with it, and it wasn't deploying properly in the test, and it wasn't latching properly and all that kind of good stuff.

SPEAKER Well first, I haven't heard what you've heard but you heard the same thing I heard, that it was deployed and then it was deployed partially and then it was not there at all. As you know the Skylab mission is much like Gemini, you don't have full coverage, you see the data in short bits, and the telemetry was confusing. It took us some time to figure out exactly what had occurred. As a matter of fact, we're still not quite sure what had occurred. And it was only in the last few minutes that we reached the conclusion that I described to you right now, within the last hour or two. So there was no lag in getting you the data, we tried to get it to you as soon as we possibly could. As far as the mandatory nature of the micrometeoroid shield, it is exactly as I described it to you. It is one of those items that we put on to enhance mission success, to increase our probability of having a full 8 month duration mission. And that was why it was put on, and not having it - it does in fact decrease the probability of having a full 8 month successful mission.

SPEAKER ... here in the white shirt.

QUERY I have a three part question for Bill Schneider. If the CSM does look this over, does it have live TV or anything to send back pictures, or will it just be a verbal account of what they see? Second, there are a number of other things that are supposed to happen before you would launch, including pressurizing the spacelab, and assuring that the debris, such as the second stage and so forth, are in position to where they won't interfere with the launch, I wonder if this has been accomplished? And third, is there a possibility that you would consider some modification to the CSM for extra power that might stretch this delay beyond next Sunday?

SCHNEIDER Let me see if I can remember all those. First and last one, which I remember, we have already issued orders to increase the cryogenic load on board the CSM to give it the maximum amount of stay time and that the ... will undoubtedly do that in the next few days. Now we have no intention or we have no reason now that we will go beyond that time, we know of no modifications that we're planning. Your first question concerns TV. We had in our original plan the ability to send back TV from Guam. We were going to be stationkeeping at that time, perhaps 150 feet away. We are, as Gene Kranz stated, revising our rendezvous procedures. One of the reasons being so that we can get back TV so that we can see what the configuration of the spacecraft is. I can't tell you that we will do that in fact, I can tell you that if we can, we will and we are assessing that. And your third question, the one in the middle, I can't remember.

QUERY The other event that had to take place - particularly, I'm interested in the debris. Is it in a position where it won't interfere with the ... docking.

SCHNEIDER The rest of the activation sequences are going on as scheduled. I believe the pressurization started. If it hasn't already started, why it will shortly. However, that's a long process. I believe it takes several hours before that goes on. As far as the debris is concerned, we will just continue to get reports from NORAD. We don't anticipate that to be any problem, but obviously if NORAD tells us there is a problem, well, we'll have a problem.

END OF TAPE

SCHNEIDER Continue to get reports from NORAD. We don't anticipate that to be any problem, but obviously, if NORAD tells us there's a problem, well, we'll have a problem.

PAO Mr. Puddy in Houston has some answers to the previous questions he would like to add.

PUDDY Okay, let me add something to this last question first. We have no reason whatsoever to believe that we have anything wrong with the crew compartment. We started our ... on time at 3 hours and 35 minutes into the mission and completed that. We have started the re-pressurization of the habitation area. This is normally an 8 hour and 45 minute process, so right now we - at least when I left the Control Center, we were planning to be up to 5.0 psi at about 15 hours and 45 minutes, elapsed time. Now, there is some discussion going on as to whether we are going to take it up to full pressure or not, but anyway, right now, when I left, the pressurization was going on nominally and its looked like like there would be no problem there. As far as the delay in conformation of the meteoroid shield, let me say that we had many indications of telemetry during that first few minutes that just didn't tag up. And most of you that are familar with space flight will recognize that there are a myriad of things that have to be checked in an instrumentation system to determine whether or not you, indeed, have instrumentation problems or they are indicating the true status of the systems. So even though this event we - as Mr. Schneider has pointed to you, we think occurred right during the max-Q period about 63 seconds into the sequence, our primary indication was to occur, once we had conformation, that OWS or AM SAS was or was not performing properly. Now, that particular function occurs outside a station contact at about 41 minutes into the mission, and the first time that we can look at that and gain insight into a tremendous increase in instrumentation that verified just exactly what we do have, is stateside on that first rev, and I believe that is, in general, when most of you got the indication that we may have had a problem in that area.

QUERY We missed the last part of that, dropping in and out of here.

PUDDY Is there some part of that that needs to be repeated?

PUDDY Where did we end up? Let me go back and summarize the whole thing as far as an indication of when you found out that we might have had a problem. We nominally expect the OWS solar array to be deployed at 41 minutes into the sequence, which is outside of any station contact. Our hope was that, since we were not able to sort out the telemetered indications that we had early in the mission, our hope was that we were going to be able to find out just exactly why not we did, indeed, have a problem when we came up at stateside, did have sunlight, and could look at the voltage and currents on the solar arrays. Up until that point in time, because of the many points of commonality, and many level-type failures that you can have in instrumentation systems, we were not able to verify whether or not it was an intrumentation problem, or, indeed, was a systems problem. So, I think you heard about it at stateside, and that's when we had our initial indication that, indeed, it was a systems problem and not an instrumentation problem.

Query I'd like to address a question to Mr. Kapryan, and again it follows along the question I was asking earlier about the crew safety. What does this do now to your rescue capability, especially in light of the fact that you are talking about a 48-day wait, if something happens on the first day when you get up there and you'd be without, say, CSM power?

KAPRYAN Well, of course, it obviously does change the situation somewhat in that the rescue concept was developed on the basis of having either a completely healthy laboratory, or a completely healthy, or if you had a completely healthy CSM, you could come back in it. If the CSM was not healthy, you could live on and on in the laboratory. Now that we know we do have a - we think we have a laboratory with lesser capabilities, I guess we're not in quite as healthy a situation as we were before this happened. However, I would like to point out that we've flown our lunar missions, and other missions, in the past, with no rescue capability whatsoever. It's another factor we're going to have to take into consideration before we launch.

QUERY It's for Bill Schneider, I guess and Gene Kranz, I know. Depending upon what the crew finds during station keeping Sunday night, is it mechanically conceivabl, and flight plan possible that they might be able to do an EVA, somewhere during the mission, and fix those panels or wings?

SPEAKER Jules, far be it for me to rule things out of the realm of possibility, but I will say, right now, we, at this point, do not know of anything that the crew can do. We may determine something between now and lift-off time. We generally would like to have the crew trained on any activity like that. That would be a long EVA and there would be a lot to do. We would have to make sure that we ourselves understood what we were asking the crew to do before we would ever undertake anything like that. Right now, we know of nothing that we think we could ask the crew to do. We will look at that between now and then. If we do uncover anything, we will then ask the crew to do some training. Right now, it's in the realm of possibility. I would say it has a very low probability.

SPEAKER Could I add a few words to that? I think probably the most likely thing would be is that we would make the assessment during this first mission. Get all the pictures and all the information we can, come back home with this information, and then, if its at all feasible, the next mission would be the one where we might conceivably attempt such an EVA.

QUERY I'm very curious as to exactly what is known about what happened. Which panels have not been deployed? Is it that they're simply not deployed, or are they gone? Do you have any indication of which it is? Is there any possible larger extent of damage to that particular aspect of the power supply than the fact that they are just not deployed?

SPEAKER There are indications that both solar arrays - there are two sets of arrays, one on each side - both of them have been partially deployed, and that there is a microswitch that tells us when we get a certain distance away from the skin. One of them did deploy at about 60 some second point, and the other one, we gave ground command during the first rev and it moved off. We haven't obtained enough data from the computer runs that we're making to establish what percent of the array has been exposed, and that will be determined through the electric power analysis. So, it would be a sheer guess to say just to what percent they are deployed right now. We don't feel that the solar arrays themselves have departed.

QUERY May I ask something? Most of the food supply on board, as I understand it, a large part of it, is frozen. Is not that not correct? Now, will this loss of power affect this food supply possibly by defrosting?

SPEAKER I have some numbers on that. The temperatures were holding, that was about an hour and a half or 2 hours ago, they were still holding within the designed limits of somewhere around minus 8 or minus 12 degrees fahrenheit. So that looks all right. The thermal control systems for refrigeration looks real good.

SPEAKER I guess I ought to say a word here because it does bear upon the earlier question on rescue capability. Our indications are that with one set of solar arrays deployed, the ATM, we have sufficient power for the housekeeping functions, and what we're really talking about is how much of the extra activities, the experiment type activities, will have to be curtailed. So, in the event of a rescue, the guys wouldn't have much to do, but they would not be in any danger.

QUERY Bill Schneider, could you put a third fuel cell back in the CSM, either on the flight that's supposed to go Sunday or -

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QUERY Joe Schneider, could you put a third fuel cell back in the CSM, either of this next - of the flight that's supposed to go Sunday, or of the other two CSMss later on, to give you more power?

SCHNEIDER Certainly not of the flight to go on board Sunday. All that would do would be give us - would be give us a rate - give us a higher rate of electrical power. What we are really concerned about is how long the electrical power will last, and that has to do with the cryogenic tanks, the oxygen and hydrogen that we have on board.

QUERY Is that set yet?

QUERY I've heard varying figures for how long it would take to launch a second Skylab. If the first crew discovers that the - this spacecraft is not habitable, how long would it take to launch the second Skylab?

SCHNEIDER Well, we're committed to have our hardware ready for a 15-month turnaround, and it is in that state right now. As Lee Belew and I discussed this today, we think that that turnaround time can easily be shortened, but we're in no position now to say just how short.

QUERY Is there a way to estimate the cost of that mission?

SCHNEIDER Well, we're currently spending on the rate of, I believe, 30 million a month and if you just extended that on f a year, that's what it would cost.

PAO Over here in the yellow. In the yellow. Okay.

QUERY The one unreplaceable experiment is the fact that man was supposed to be aboard this thing for extended periods of time - the medical research for future experiments. Much of the rest can be done by unmanned satellites. In view of that fact, is there any specific attention being given just to the fact that keeping men up there for as long as possible, within safety, of course, and minimum power requirements, for future space missions?

SCHNEIDER Well, I think our medics have said it many times. The value of the Skylab long-duration mission is not in the long duration itself, but it is, in fact, due to the fact that we will be getting data in flight on the astronauts' conditions, as the flight progresses, and that is the experiment part of Skylab, so just staying up there, without medical data, gives you a very minimum amount of data on which to base future flights. As far as whether or not the Skylab experiments can be done on unmanned flights, that's not quite true. Very, very few of them can. We feel that we would - If we - if we're forced to curtail all of these experiments, why we have had, no doubt about it, a loss that we, sure as all heck, wish we hadn't had.

PAO In the green over here.

PAO Okay, how about coming back over here then.

QUERY Will the power transfer, from the CSM, require any physical installation of wires, like an extension cord?

PAO Gene Kranz, you want to answer that?

KRANZ We call it an umbilical - -

SPEAKER Go back; the key reason for maintaining the cryos is to allow the CSM to support itself. We don't want the CSM to become a parasitic load upon the workshop. Now after the cryos are depleted, around 1200 watts power will be transferred across the umbilical to the ATM SAS to maintain a thermal conditioning of the CSM to maintain the communication systems which we use. And, also, to provide support to the heaters on the CSM propellant tanks, those type functions. Now, one of the things that's interesting everybody's holding the post mortem already on the mission, and I think it may be somewhat premature. I do believe, that we do have a capability of doing some significant experiment work up here, particularly during the period of time that the CSM is active. We'll have roughly between 12 and 800 watts of power available, and I believe we can do a pretty good job with that power.

QUERY To Mr. Schneider. Does there remain any technical possibilities of extending the large solar rays in the workshop from ground command?

SCHNEIDER I'll let Gene Kranz correct me on that, or maybe Don can. But to my knowledge, we have sent all of the backup commands that we have and all of the ordnance that we have, while all the backup ordnance has been expended.

KRANZ That is correct. We - we have fired all of the backup ordnance, and there is no other command action that we can take.

QUERY Last night I was told by a public affairs officer, that the fear of - on airlocks was not the reason for the micrometeoroid shields. It was one of the reasons. But the basic problem is that the workshop is lined with an insulation which is considered highly flammable, that the reason that the micrometeoroid shield was - dissipate heat from a - from a puncture before it punctured the inner shell. So what influence would that have on the mission now, if that hazard does exist, of a fire?

SPEAKER Well, I try to - I try to make agreements with Public Affairs that I won't tell them how to write newspapers, if they won't answer technical questions. It was an error. There is - The material under the - the insulating material has been well tested with micrometeoroid punctures and fires of all types; there's no hazard there. It is to prevent penetrations of the shells to extend our mission life - or increase the probability of having a full mission life, due to micrometeoroid penetration. You were given erroneous information yesterday.

PAO Keep on moving back here a little bit on.

QUERY If you do send up the Skylab B, will there - will you have any modifications in the - in the system to try to avoid the - the same problem again?

SPEAKER Yes, yes.

(Laughter)

SPEAKER It's too early to say what it would be. We haven't evaluated this situation totally.

PAO Okay, over there - -

QUERY Bill Schneider, what was Conrad's response when you told him about your decision, and will the astronauts have to give up any of their creature comforts as part of the new power budget?

SCHNEIDER Well, I'm not going to comment on what Pete's comment was. He once said he plans to go to Houston tomorrow - he's flying to Houston tomorrow. And and his plan while he's there is to participate in the flight-planning activities to optimize our scientific return from the mission. So, he obviously was disappointed and certainly was ready to go, but he's a good troup, and he's going to help us in every way he can to get as much as we can out of it, and as Gene Kranz said, we think we are going to get quite a bit out of it.

PAO Over here, please. I'm not trying to ignore anybody, but I'd like to get these people who have not had a chance to do one job anyway.

QUERY For Houston, what's your best guess as what caused the meteoroid shield deployment early? Did it exceed the dynamic pressure you expected, or was it the firing of the ...? - premature firing.

SPEAKER I'd be inclined to pass this one back down to the Cape because we're limited principally from a standpoint of the instrumentation we have, And, like I say, we traced it or tracked it down assuming that it was initially an instrumentat problem, so I believe you ought to get the answer to your question down at KSC.

SPEAKER The shield, which we feel did prematurly deploy - what data we have says it didn't deploy because there was a signal - electrical signal - that would be required to initiate explosives that shears a structural member. That kind of puts you down to other things, and those other things are not yet known to us. It could be due to pressure under the shield, the source of which could have been trapped at that postulation only. And other postulatedgcauses. We're just not that close to getting the data analyzed yet. And that's part of the effort we have underway tonight.

QUERY Is it possible that these fuel cells could be recharged by later mission, to extend these times up there?

SPEAKER No. The fuel cells, as you know are CSM fuel cells, and the transporting of cryogenics is pretty tough. The fuel cells, of course, are in the CSM. And they are, along with their cryos, replenished on each mission.

END OF TAPE

SPEAKER (garble) and they are, along with their cryos, replenished on each mission.

QUERY First of all, are the orbital workshop solar wings completely independent of each other in the sense of deployment?

SPEAKER As far as the signal that would have been a normal signal for deployment, they would be deployed by a single signal. As far as mechanical and all other aspects are completely independent.

QUERY Wouldn't it be logical if you act - be able to actuate them from the ground completely independent of each other?

SPEAKER Well, yes. For instance, we didn't get indications that one had begun to move at the - around the 63 second timeframe, and the other one showed indications of being in place. We did give a signal separate from the ground on that one, as I mentioned earlier in this conference.

QUERY Can you place a watted figure on minimum daypass, nightpass workshop usage wattage? And also confirm that - that the one solar array did partially deploy at 60 seconds into the flight.

SPEAKER I guess, Bill, the five KW being the power that we'd have when the CSM's up, which gives about 1.2 KW spare, and do a little subtraction there, and you get about 3.8 KW for the basic housekeeping activity. Plus average, yes.

SPEAKER Some of your co-host have been waiting patiently in Houston to ask questions; so we're going to go to them for some questions now.

SPEAKER Let me catch the questions of Peter -

QUERY Is there any possibility of using the command module to yank the solar array out? Is that being considered either on this subsequent missions?

SPEAKER We had a very brief discussion on it in the Mission Control Center. Looks like the only thing you could use might be the docking probe and that wouldn't seem to be too good an idea since you want to use it for docking. We've got guys looking at it, but we don't feel that's a practical approach.

SPEAKER Steve Young, CBS.

YOUNG Could you explain to us what the possible interrelationship is of the early deployment of the meteoroid shield to the problem with the solar panels on the workshop; two, how you understand the simultaneous failure of two independent wings; and three,, whether you think at this point retrospectively was overconfident to just allow about 24 hours of shakedown for so complex a system before sending men.

SPEAKER Well, in answer to your last question first, no, we do not feel that a 24 hour shakedown was too little of a time before sending men aboard. I think the answer to your first question - There is a definite interrelationship, we feel, between the problem that we've had here with the meteoroid shield and possibly the problems that we've had with the wings. As you're well aware, we indicated that that failure did occur about 63 seconds into the launch sequence, which is during a period of extreme vibration environment. And it is extremely possible that the vibration environment or, as has been mentioned, some gases trapped underneath the meteoroid shield did cause the problem. Since the meteoroid shield is underneath the wings, it's also very probable that there is a mechanical interrelationship there that is causing those wings to not be able to be deployed. We did lose the secure indications which indicated that they have come partially loose but they did not deploy. There is not a large force. Strictly a spring associate with those beam fairings to cause them to deploy, and if the beam fairings do not come out, then of course we nominally would not expect the wing sections to deploy.

SPEAKER Ed DeLong, UPI.

DELONG A couple of questions to follow that last answer up directly; if the beams did deploy, would you expect the wings s to deploy?

SPEAKER Yes. Yes, they are an independent function.

DELONG Okay, so what you're saying, essentially, is then you don't think the beams are out all the way either.

SPEAKER We do not feel like the beams are all the way out. No, we lost - We called the secure indications which means that they have moved a very short distance away from the structure. But it certainly does not mean that they came out to their full deployment position.

DELONG And two quantitative questions. How much additional cryos will be put in the command module, or command service module, and how much power are you getting from those solar panels that are in question? Have you been able to measure it?

SPEAKER I think the question on the additional loading on the CSM cryos should be passed to KSC. As far as the amount of power that we're actually receiving from the AM wings at this time - it's very difficult - you talking the AM wings now? The ones that we think we've got the problem with. The power that we're receiving there is very negligible. In fact it's almost something that you would question whether or not you have - It's within instrumentation tolerance, I guess I should say. So we're not sure whether we're actually receiving much power from those wings at all.

QUERY More like the Sun just catching - just sort of reflecting up under the end of the folded up wings and catching just a few cells?

SPEAKER Very possible. It's certainly not anything that we can consider to be a sustained power output from those wings.

SPEAKER Paul Cambell.

QUERY Will the crew maintain their modified isolation through this next period?

SPEAKER I assume they will; I don't see any reason to change it.

SPEAKER Let's see, do we want to switch to KSC on the previous question and let them elaborate on it?

SPEAKER Okay, I think I can answer that one. We're not going to load anymore cyrogenics into the tanks than we did for this attempt. We're going to do it closer to launch time than we did this time. Since we were running to do a countdown, we sequence things to do them at a different time. Since a nominal mission called for a lesser requirement for cyrogenics than we've had in the pass, we loaded earlier and we, as a result of the boiloff and the fuel cell operation for several days longer on up with lesser cyrogenics aboard. What we will do for Sunday's attempt, we will load cyrogenics I believe probably some time on Friday afternoon. And the number is for oxygen on the order of 500 pounds and for the hydrogen on the order of 90 some pounds. And this will enable us to have about a 15 percent greater margin than we would have had had we lifted off tomorrow.

QUERY I've got a couple. First of all, you did put a third set of cyro tanks in the CSM after the Apollo 13 problem and I know you had to take those out to put in the expanded RCS and you also took some SPS out to expand the RCS. But is it possible you could stick a third set of cyro tanks back in the CSM for the Skylab 3 and 4 missions. And the second question is: Usually when there's a problem we hear an awfully lot about the simulations that have been done, but I haven't heard a word about trying to reproduce this failure and see what kind of force it might take, for example, to - in the docking. Will the force of docking jar the panels loose? Or has any attempt been made to reproduce that beam failure lockup or whatever it is?

SPEAKER As far as I know right now there has been no attempt made to actually simulate the particular problem with the beam fairing. However, if we do have a beam that is partially deployed and we have the wing intact, it is possible, I'm not saying it's probable, but it is certainly possible that the force associated with docking might cause that beam fairing to snap into position.

SPEAKER The cyro I think better be passed to KSC.

SPEAKER (garble)

END OF TAPE

QUERY Houston mentioned that there's sort of a post mortem attitude on this thing, and I think it's a shame. I think it would be well for us to remember that you men have worked for months and years on this thing, and you did phenomenal job. And I - I personally salute you.

SPEAKER Maam, we personally thank you. (Applause).

SPEAKER Okay, excuse me. I think that was a question from Houston, and I erroneously went to other questions from here.

SPEAKER I think the question was with respect to, could we put the third set of tanks in? Well, of course, we couldn't for Skylab 2. And it is quite a major modification to get back to it. If it was deemed necessary for Skylab 3 and 4, I think it's - It's possible that it could be done in that timeframe. However, you have to recognize the fact that we are now processing the Skylab 3 vehicle, and if we were to do that, that would significantly delay the Skylab 3 launch.

QUERY A couple of television - planning questions. You said that there's going to be an attempt to get up and turn the television on as soon as possible for visible inspection, is that right? I think Mr. Schneider or someone said that before. What is the time frame on that, approximately? Secondly, what will be the overall impact on mission video of this power shortage?

SPEAKER Okay, the answer to the first question. We're still studying the entire, as I said, launch rendezvous procedures, and the video plan will be part of that. One of the items we asked Marshall was to give us a detailed listing of those points that might impact the structural capability, the thermal capability, and the electrical power capability; and once we've got that information back, then we can set up an optimum video viewing plan so that we can get that information bamk down and, hopefully, be in a better position to support the workshop, once it's manned. That answers the first question. The impact upon the TV plans; I think, during the course of the mission, it may be reduced somewhat, but I wouldn't expect it to be reduced any significant extent. Particularly during the early portion of the mission where the CSM is capable of supporting the - its own power loads, actually where we have CSM cryos remaining. After that period of time, it may may get a bit schosh.

SPEAKER Okay, I think we're going to be able to take one more question from Houston, David Crain, KTRH.

CRAIN Gene, I would like from you an interpretation of what Bill said earlier. I get the indication from what he said, as far as the EVA and doing the repair, that it was not a matter of what the crew could do, but what they would let the crew do. How about a breakdown there. And the danger, is it the spring mechanism of the PYROS gone, is it the spring bursting out, what - -

KRANZ Let me go back. Many months ago we reviewed the capabilities to correct certain type of mechanical malfunctions in the area of the - actually the total workshop. And, generally, we restricted, and this is due to many things - We restricted the majority of the EVAs to the area of the MDA, the ATM, the ATM truss, that general location. Principally there's several factors that go into it. First of all, there don't appear to be any good transfer paths for the crew to get back into that area of the workshop. Secondly, the umbilical length is constraining, and, thirdly, we were somewhat concerned about some of the pyrotechnic and separation devices leaving sharp edges in the area of the meteoroid shield. So, from a standpoint of early mission assessment many months ago, we pretty much scrubbed any EVA-type work back into that area of the workshop. It just didn't appear practical.

QUERY I sure would like to congratulate Bill Schneider for having such bubbling optimism after losing half of your power. I'd like to know if I could, if you could give me in specific terms how much you think you're going to lose in this mission, that is, out of 100 percent? Because you ... And second of all, what kind of testing, specifically, was done to see what kind of vibration it would take to rip off this shield?

SCHNEIDER Well, A, I've already lost half of my bubble. I can't really tell you how many experiments are going to curtailed. We're going to replan that, and we have to look at just what the effects are. It's possible that there may be a number of experiments that will not be activated because of this. As Gene says, it looks as if we'll have a lot of power in the early part of the mission, not as much as we had planned, but enough to do a good adequate mission. In the latter part of the mission, we fully expect that we will have a very lower much power available to conduct experiments. If that assessment, which both Gene and I gave you, was bubbling, why I guess I have a low bubble quotion. As far as how much testing has been done, I'll pass that to Lee Belew.

BELEW The shield is very light weight designed, and it has to be in order to be deployed with relatively small sources of power spring-loaded torsion driven structural arms. The shield, as far as its basic design, has gone through all the various static structural tests with the right safety factors. The simulation as far as inflight profile, as is not possible to do, so, that the deployment type test we did do, and we did them as late as here at the Cape. We have to simulate a zero-g environment and suspend the shield with broad and long wires, so to speak, not to induce too much residual force on them. And, those tests were primarily for the sake of determining that they will latch and stand out as compared to the structural tests that were done on the more or less subcomponent level in that we just have no means to simulate the space environment as far as overall structural tests in a sense that would duplicate what we really see. So, again we thought that we had the right test program behind us, and the flight profile that we see going up, you cannot simulate as far as back pressures and the dynamics of going through max Q and all of that. Some of those tests we just can't make on the ground.

QUERY Which is the more accurate figure to use as far as the maximum time they can stay up there, 17 or 21, and how much of that time do you think you'd be able to do the good adequate job you mentioned awhile ago and how much of that time would it be pretty poor?

SPEAKER Let me repeat again. We have high hopes that we can stay up 28 days. I had originally said the fuel cells would run out at 21 days Gene Kranz corrected me and said that is 17 days, and he is closer to the correct number than I am. At the end of those 17 days our assessment today is that our power available would only permit us to run a mission with fairly minimal experimental activity. And we have not determined just how much of that activity we will be able to conduct. A lot of that is going to depend upon how the spacecraft behaves in the next few days. We're really not quite sure how much parasitic power all of the subsystems and components do really draw. It's all been theoretical up till now.

QUERY Then it was perhaps some confusion that Skylab Control in Houston said earlier that there could not be a 28-day mission if you did not have full deployment of shield - -

SPEAKER No, now let me say again, we think the latest assessment is, that with only the ATM panels deployed, we have sufficient electrical power to take care of the housekeeping functions with a few watts left over. That is correct, is it not, Gene?

SPEAKER - - and he stated that to his recollection - he stated that we could not have a 28-day nominal mission. I think the real key here and is going to be, how much of a parasitic load we have induced by the heaters? At the present time, our best guess is that even after the cryos deplete, we believe we'll have something like around 600 watts of power available for experiments. It could be somewhat more than that - -

END OF TAPE

SPEAKER After the cyros deplete were - We believe we'll have something like around 600 watts of power available for experiments. It could be somewhat more than that and this will allow the continuation of certain experimental activities through until the completion of the 28 days. We're playing with much smaller margins than we had in our initial mission planning, and I believe as we go through the flight plan over the next several days and in particularly the checklist, that we'll be able to make more power than that 600 watts available, once the cryos deplete.

SPEAKER Kenneth Bluebacker.

QUERY Mr. Scott, I understand the Air Force has a camera with a particularly strong lens that enables it to see the Skylab 1 as it passes over the Cape. With the cloud cover I don't imagine you could see it today, but do you anticipate looking at it - at that camera to take a look at the solar panels?

SPEAKER I imagine there will be a lot of telescopes trained on it in the next few days. We looked at the cameras from the Cape here during the launch phase to see if they picked up anything. My recollection was that they ran into clouds at 40 odd seconds and they got nothing.

SPEAKER Okay, over here, please. I'm not trying to slight anyone but I'd like to get into everybody on a first shot basis here, if we can.

QUERY I think I might be mistaken, but we had two figures on how much watts are produced right now. The one was 5,000 and the other one was 1200, and that, I think, came from Houston. So what would be the correct figure, and is it correct that altogether the station was expected to produce 22,000 watts?

SPEAKER Five thousand being as far as the mission we are now talking about from both fuel cells and one set of solar arrays on the ATM. The combination of the two was 5,000. And the 1200 came from that contributed by the fuel cells to the system. The total power that we would have had on a nominal mission would average out at about up to 8 KW.

QUERY On December 7, 1957, the United States suffered a terrific loss of prestige with Vanguard still upon the pad, and tonight I'd say we have a space station which is throwing (garble) three quarters full. They can either look at it as being full or empty. I tend to look at it as full, es'specially in view of the (garble) situation. And (garble he's really done a magnificant job today, and I'm quite sure we'll have that successful program.

SPEAKER We thank you.

QUERY I would like to know if the solar telescope appears to be intact, and if so, what effect will the power shortage have on your plans with the solar telescope.

SPEAKER The ATM looks all right. It deployed very well and we had an initial acquisition of the Sun quite well until we had the anomaly that was earlier discussed with the power sharing that will, of course, eat into each of the major experiments and as such. It will have to give up it's share also.

QUERY I'm sort of confused by some of your wattage figures because I've been reading all day that you get something like 10,000 and a half watts from the ATM solar panels and 12,000 supposedly from the one from the OWB - or am I - I am not a very good electrican. I was talking about 5,000 only from the ATM.

SPEAKER We, of course, have to design for the average - for the whole mission, and half of the time you don't - you don't generate power; and what you were reading is the maximum power during the optimum sunlit portion of the mission. See we - we'll take in, say on the ATM, up to maybe 8, 10 KW and run it into charger batteries and we'll store it and then use out of that during the dark side, and the result is an average power use, say on the ATM, only of about 4 KW. And by the way that's conservative. That's on the low side in order that we don't plan more activity then we can generate power to support.

SPEAKER Okay, we've got about 5 minutes here, so I can only take this time to question.

SPEAKER Bill Schneider or anybody, could you again spell out the relationship between the micrometeoroid shield accident and the - the power panel disaster? Does one contribute to the other? Or are they seperate events, or are they separate accidents, or what?

SPEAKER Right now, we're reasonably certain that one contributed to the other. That the first occurance was the failure attributed to the micrometeoroid shield and early deployment. We think in some way that has bound up or cramped or inhibited in some way the full deployment of the solar array. We only have instrumentation on the solar array that indicate that it has released and that it has gotten to full deployment. So it has released. It has not gotten to full deployment and just exactly where in between we don't know. We do think the two incidents are related.

SPEAKER I guess the simple part of it is the micrometeoroid shield lies snug against the skin of the spacecraft. The solar array does fit over that. If the shield lets go first, it would have a tendency to want to push the array out. So the sequence - the normal sequence is, of course, for the solar array to go out first and then the shield comes out quite a bit later. So if we got an erroneous deployment of the COI it would definitely influence the solar array.

QUERY If after the crew gets up either in - through the docking forces or some other manner, the panel should be fully deployed, how much of the original flight plan could then be recovered?

SPEAKER If we get full electrical power, the only thing that would be wrong is that we would have a lower probability of not having a small puncture due to a micrometeoroid, and we would plan then to go, I'm sure, right on with the full mission.

QUERY With the panel gone, wouldn't you assume that the panels - With the shield gone, wouldn't you assume that the panels tore off?

SPEAKER It didn't deploy. The thermal indications are that the panel is the - that the micromereoroid shield is no longer there. And it happened in what? Right in (garble) 3 seconds. Chances are the panels could be gone. We believe they are gone.

SPEAKER Thank you.

SPEAKER No, we don't believe that the solar panels are gone.

SPEAKER Not the solar panels. I thought we were talking about the micrometeoroid shield.

SPEAKER The solar panels, we feel, are still there. We lost the temperature probes. They all went off-scale high and off-scale low on the micrometeoroid shield at 63 seconds. We had temperature instrumentation on the solar panels, and they gave perfectly normal readings through that time.

QUERY Mr. Schneider, what will the astronauts be doing during the next five days? I assume they'll be doing whatever it is in Houston. And is there a possibility that you may have to scrub SL3 and 4?

SPEAKER We expect that the crew will be, as I said before, helping us replan the missions. We will undoubtably ask them to practice a few fly-around procedures so that we do get good pictures as to what the - vehicle looks like. As Gene said we expect to replan our rendezvous sequences somewhat so that we can get good TV coverage and, they will be undoubtedly practicing that. As far as is it possible that we may scrub SL3 and SL4 - not, based upon what I know today. It may - this may become that serious, but right now it does not look that serious.

QUERY Mr. Schneider, assuming the mission goes beyond the 21 day or the 17 day cryogenic depletion, and I would have liked to find out is, after undocking what power is left in the CSM other than the re-entry batteries? Is there other power in the service module?

SPEAKER Well, if you recall - if you recall we planned for the CSM to deplete it's cryogenics in the normal flight in this normal manner. We're not doing anything differently except coping off the tanks. And we have put extra batteries on board and redundant batteries on board for re-entry and that was our normal preplanned way for re-entry into Skylab.

SPEAKER We have time for one more question. Takeit right here.

QUERY Mr. Schneider, I have two questions, short ones. Number 1 - -

END OF TAPE

SPEAKER ... preplanned way for re-entering Skylab.

PAO Now we have time for one more question. Take it right here.

QUERY Mr. Schneider, I have two questions - short ones. Number one: Has NASA considered alternating experiments between flights? And number two: Have they also considered the relationship between the Apollo 1 incident and Skylab now - both of them now functioning?

SCHNIEDER As far as your first question goes, we have, as you know, had some experiments that were planned for the first manned mission, some for the second, some for the third, some for - that were planned for two and through the missions, and some of them that were planned for three. And we'll probably stick to that plan, although the exact number of hours that we're going to be able to devote to particular experiments will be under review. As far as the failure of the first Apollo mission, are you referring to 204? I can think of no - absolutely no relationship whatsoever between this and that. We - There's no indication of any fire hazard or anything like that on Skylab at all.

PAO Gentlemen, thank you very much.

END OF TAPE

SKYLAB-I POSTLAUNCH BRIEFING 5/14/73 CST 13:45 PC-3A/1

PAO Okay, I think we're ready to begin the Postlaunch Conference here. I have with me Director of Launch Operations at Kennedy Space Center, Walter Kapryan.

KAPRYAN Good afternoon, ladies and gentlemen. There really isn't much to tell you about the countdown because it was very nominal. Only a few very minor problems, not even worth reporting, and at no time was there any consideration of a hold and possibly not going on time. When I came in I had my weather briefing with Ernie Amman. At 5:30 in the morning, he reported that we would be having thunderstorms at lift-off time, but within 3 hours he changed that to what we actually did have. So, weather-wise, it's been a good day. Lift-off occurred 281 milliseconds late. S-IC center engine cut-off came at 3/10 of a second early. S-IC outboard engine cut-off occurred half a second early, second was 1/10 of a second late. S-IC S-2 separation was 0.42 seconds early. S-2 ignition was 1.71 seconds early. All the other events were that close to nominal. Orbital insertion was 1 second late. Orbital velocity is 25,096.6 feet per second, which was approximately 39 feet above nominal. Now these are preliminary figures, so please don't shoot me if they are wrong. And I think you are probably following over the Flight Director's loop the sequence of the cluster deployment. Payload shroud jettison occurred about 15 minutes and 25 seconds into the flight. The ATM was deployed at 21 minutes 34 seconds. The ATM solar arrays were deployed at 26 minutes 38 seconds. And,as of this moment, we have not been able to confirm deployment of the OWS pass wings. So I really don't have any more to say. Countdown was perfectly nominal. Any questions?

PAO Mary.

QUERY I understood that they had been deployed and then they said it hadn't been confirmed. Then they said they were waiting for Honeysuckle; then they said they were waiting for Texas - -

KAPRYAN They're having trouble with data drop-out. I guess the quality of the data isn't good enough to really confirm it definitely and I guess we'll just have to wait.

QUERY Well, do you think you have a problem or not?

KAPRYAN I don't know. The data just wasn't good enough to confirm it so, I - -

QUERY So, you don't have any indications of a problem, do you?

KAPRYAN No.

QUERY You just know. Is that it?

KAPRYAN We just don't know.

QUERY Okay.
QUERY When will you know?
KAPRYAN Let's see when it comes over the States. When is that going to be?
SPEAKER I'm not sure yet.
KAPRIAN We'll get it in the next pass over the States. I guess - -
QUERY How long?
SPEAKER We'll have commentary coming during that time so there'll be update on that.
QUERY What's been planned for the remaining of Saturn-V rocket that's in moth balls right now?
KAPRYAN The plan for remaining Saturn-V rocket at this moment is not to fly anymore.
PAO Down here in the front.
QUERY What's the weather position about tomorrow's launch. You now have a fixed window 6:00 to 6:10, haven't you?
KAPRYAN The weather forecast for tomorrow, at the moment, is that it will be very similar to what we had today. If anything, it will be a little better.
PAO Back up here again.
QUERY If you don't get a positive deployment on the SAS wings will you launch tomorrow?
KAPRYAN Well, the flight management team is going to have a conference at 7 o'clock tonight to give the GO, NO GO for tomorrow's activities. And, the Program Director will be in charge of that. There are some conditions under which we would go and we would not, I can't give you a flat yes or no answer to that.
QUERY But right now we can assume that it is going off tomorrow on time?
KAPRYAN Yes.
SPEAKER Okay.
QUERY When is it you'll know about the SAS wing; what time?
KAPRYAN I don't remember the time. I heard, when I was in the little booth there, they'd have to wait until the next pass over the States. And, frankly I'm behind on the time line, I don't know exactly when. It shouldn't be too long.
QUERY Could you tell us what a SAS wing is please?
KAPRYAN It's the two solar wing assemblies that supply the Solar energy for the workshop. As you know, we have the solar array for the ATM nd we have the solar array for the workshop. We're talking about the one for the workshop.
PAO Go ahead Ray.
QUERY Can you tell us in language I can understand, how you will discover whether these solar wings are

deployed. Will Mission Control interrogate the spacecraft?

KAPRYAN Well, yes. The telemeter data that comes down will tell us. We have switches on board and we also have other parameters, power parameters, state of batteries, things of that nature that will give us that information.

QUERY Without deployment - -

SPEAKER Go ahead Dick.

QUERY Without deployment of these panels, there is no mission, of course?

KAPRYAN Without the deployment of the SAS panels we could not fly the full blown mission. I think we could fly a reduced mission, and whether we would do that, or not, is not up to me to say.

QUERY Where was the Skylab 2 crew during the launch?

KAPRYAN In the general area. I don't know. They have been relaxing and they're going to continue relaxing. Their activities for tonight are rather, for the rest of the day are just to kind of take it easy. They're going to do a little bit of reviewing of their flight plan. I don't know exactly where they were located for the launch.

SPEAKER Kap, I can help out a little bit on that, I think. There are 2 sites that the crews use. Of course, the crew is in quarantine. Primary contacts with them include their wives. Two of the wives were with the astronauts. The Weitz's were together and the Conrad's were together. Mrs. Kerwin was with the astronaut's family at a different site. This was for launch. They have returned now to the crew quarters.

QUERY Based on preliminary data will you tell us what the estimate is on the time for the revolution of the Earth at this particular time?

KAPRYAN You mean, what orbit is the - the best information I have, we acheived 236.5 nautical miles circular, and we were shooting for 233.8, I believe.

PAO Over here.

QUERY Kappy, can you say what part of the mission will be affected if the SASS wings did not deploy, what the specific experiment?

KAPRYAN Well, I think, I'm really not the right one to ask, Sanders, but I think the OWS SAS does not deploy, then the mission will be very seriously degraded.

PAO Will you get a mike up here?

QUERY Yes, when will be the first pass over of the Skylab in this area and where will it be visible to this area?

SPEAKER We've got data on this in the newsroom and it will be updated according to the orbital parameters, but Kappy doesn't have that here.

QUERY Will the spacecraft be visible from the ground at any time, or what sort of telescopic modification?

KAPRYAN I understand that there's going to be, at dawn and dusk when the spacecraft is passing over a given area, about a 10 minute period where you should be able to see it with the naked eye.

QUERY At dawn and dusk only?

KAPRYAN That's my understanding.

PAO Mary.

SPEAKER You're not coming through Mary.

QUERY The communications aren't too good. Under what conditions would the crew go, if the - -

SPEAKER Okay, Mary hang on, we've got another mike coming t o you.

QUERY Under what conditions would you send the crew up tomorrow if the SAS wings were not deployed?

KAPRYAN If the SAS wings were not deployed at all, I frankly doubt that we would send them up. It would depend on the - what the circumstances were. If the wings are partially deployed, though not fully deployed, and they held to the systems in general, which probably would be the determining factor. And, I'm really not the right one to ask that question, Mary, I'm not going to be involved in that decision. I'm going to go home and go to sleep, while they're having that meeting.

QUERY Well, could the astronauts do any fix-it-yourself kind of thing if they were partially deployed?

KAPRYAN We're not set up for an EVA to do that kind of work.

QUERY I thought perhaps from inside, through other controls, maybe switches, or something?

KAPRYAN There are no controls for deployment within the bird.

QUERY No switches or anything?

KAPRYAN No.

QUERY In other words they either go out or they don't go out? Right?

KAPRYAN They either go out or don't go out. Man can't do anything about it. That is the astronaut can't do anything about it.

QUERY Can you do anything from the ground about it?

KAPRYAN I think that we can send commands.

QUERY And, you think we ought to know for sure, one way or the other maybe, within this next pass?

KAPRYAN I would think so. Yes.

QUERY Okay.

PAO Over here.

QUERY What's the trouble that you're not knowing why the SAS is not deployed. Is it something in the spacecraft or is that you can't get any information?

KAPRYAN You know you're asking me a lot of questions about something that's a complete unknown to us right now. The problem is that the quality of the data, when we passed the station immediately after the wings, the SAS array, was to have been deployed that part of the data was very poor And we were not able to make a proper determination.

QUERY Why is the data so bad?

KAPRYAN Well, sometimes it's noisy, you have problems acquiring. Sometimes the ground station over which it's passing might be having a problem. Those things do happen quite often.

PAO You have any more questions? One over here.

QUERY Yes, what was the cloud ceiling at lift-off and have you had any - ever had any cleaner Saturn-V counts?

KAPRYAN No, we have never had a cleaner Saturn-V count. Of course, you have to recognize that we had one less stage this time. The main clouds were cirrus clouds at 20 000 feet. And, I guess about an hour or so before launch some cumulus clouds started coming in and they were, I think - I think they were around 6 to 8 thousand feet high.

PAO We have one more question up here in the corner if we can get a mike up there.

PAO Can you come down to one of the mikes? That mike there is bad. If you can come over here, we can take your question.

QUERY Are any activities planned for the astronauts? Normally, they fly within 24 hours before launch as one way of avoiding motion sickness. Is anything like that planned?

KAPRYAN It's my understanding that they are not planning to fly before lift-off. I think the mode is to relax as much as possible.

PAO Have any mo questions? Thank you very much, Mr. Kapryan.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

SL-II Crew Postflight Press Conference
Johnson Space Center
June 29, 1973
9:00 a.m. CDT

Participants:

Pete Conrad, Commander
Paul Weitz, Pilot
Joe Kerwin, Scientist Pilot

SL-II CREW POSTFLIGHT CONF.
6-29-73

SL-II PC-81A/1
Time: 9:00 CDT
6/29/73

PAO Good morning, we're ready to get started with the postmission news conference, for this first Skylab crew. Captain Charles Conrad, Commander Paul Weitz, Commander Joe Kerwin. We'll start with Captain Conrad.

CONRAD Good morning. It's good to see everybody again. I might ask you a question; is there anybody out there that wants to ask me whether this mission was going to be as exciting as going to the Moon now that it's over? I really only have one short thing to say and then we'd like to show you some pictures and turn it over to you. I think the most important thing we found out on the mission and that we can do for Al - we've already had some discussion informally with the other crews - but give Al the confidence from us being there 28 days that they've got a good home, and it will go for 56, no strain. And other than that, I'm particularly pleased at seeing the number of objectives of the mission that we actually got accomplished per the original flight plan. I thought they were quite high and in view of the extra EVAs and the extra time that we had to spend, I was particularly pleased that we could get it back to a basically nominal SL II preplanned flight. And with that, I'd like to turn it over to the pictures. Yeah, I think these first films were before any fixes were made. They were done on the initial rendezvous in flyaround, of course they are speeded up. You can see all the missing meteroid shield. You can also see that on the Sun side it has gotten quite scorched. I'm not exactly sure, and haven't heard from the analysis whether the scorching was all from sitting in the sunlight after the flight or whether some of that was put on there after the meteoroid shield left by the atmosphere. We do have some camera work that is going to come up to show you Paul's tool there. We're actually doing the SEVA at this point, trying to pull on the very end of the meteoroid shield to break it free from the strap. Yeah, could you bring the lights up just a little bit so they could write. Yes, Paul is mentioning you can see the solar panel deflecting as he pulled on it. We applied enough force through the tool to perturb the workshop and make the TACS thrusters fire and also pull the command module towards you. You can see the tool again, he's trying to get it under the strap in the extreme right corner. This was taken out of a fixed camera in my window. Our estimates of how closely we flew - I think that we got the docking probe probably within less than 2 feet of the vehicle on occasion. As usual you can fly extremely well, and I was pleased with the amount of control I could have even in a hard-pressure suit. We're going to show you our first soft docking and then later on I ran

SL-II PC-81A/2
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the camera through the subsequent attempts to dock when we had the probe trouble. Yeah, these docking attempts here are when it would not dock. You'll notice the docking target is off in the extreme right. We've also shifted the camera from my window to Paul's window. And I'm closing here for one of the unsuccessful attempts. You'll see contact and you'll see it bounce off again. And there we hit and we're bouncing back out again. I really poured the coals to it on one occasion. There's rather a large ding in the docking drogue that Al will see because I wanted to make sure that we were contacting at enough velocity you know. And in the past, if you close too slowly sometimes the capture latches won't make. And there we are going into darkness. I might comment, the stationkeeping at night was very easy. And I got many extra hours of stationkeeping practice there until we finally got it docked. Here's home, leaving. You can see the sail, you can see the one deployed solar panel. And even from this distance I did not complete the flyaround all the way around because it was obvious to me, even though during translation we weren't using any forward-firing thrusters that maintaining attitude - -

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CONRAD - did not complete the flyaround - all the way around because it was obvious to me, even though during translation we weren't using any forward-firing thrusters that maintaining attitude did. We could see thruster impingement from the command module on the solar panels and we did not want to hose the vehicle down, so at this point in time I've let it drift out deliberately to about 750 feet or so and we're just letting it slowly slide away on reentry day. I think we had mixed emotions about leaving. We had schooled ourselves for 28 days so we were ready to go home, however, it had been an extremely comfortable home while we'd been there. We sort of hated to leave it, get back to 1 g. Could we have the slides, now? We've got a selection of interior shots here for you, some 35 millimeter - 55 millimeter lens out the window - 300 millimeter lens out the window and some couple of Earth resources, S190A film, which is spectacular I think. Joe is conducting one of his medical exams. You can see our sort of Chinese faces there where, without any gravity, your cheeks seem to float up a little bit and your eyes sort of get the slanty-eyed look. I really don't know which one of the physical exams this was. Joe did that about once a week on us and so I don't really know which day in the flight this was taking place. I think it's rather late in flight though, wasn't it?

WEITZ I guess so. We didn't start taking pictures until about the third time.

CONRAD Yeah, that's right. Could I have the next slide, please. There's our little portable fan that we rigged to blow on the OWS heat exchangers, and we found that that really did add to our cooling down in the workshop and accounted for an extra 2 degrees or so drop in temperature in there by using the little portable fan. Our main air supply comes in by the duct next to it. And here's our friendly screen which we have a picture of later on to show you some of the debris it picked up. Most of our air circulation in the workshop passed through that screen down by my knees and if we'd lose an object - if we were patient it would show up on the screen after a while. Could I have the next slide, please. Joe you want to comment on your -

WEITZ All these slides have been reversed so far. It hasn't made much difference but it sure is going to when we get to the geography. So when a projector - so when we get a chance could you flip - or however they are arranged there but they are reversed.

KERWN Yeah, very briefly one of the objectives that I had in mind was to utilize all the medical equipment I had onboard whether I needed it or not, just to get a leg up on the design, the working conditions, restraints and so forth. I am here examining either a throat smear that

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I took of Pete, grow it in the incubator and then plated it out - stained the smear and examined it, brought the slide home or a blood smear that I did on myself for the same reasons. My general finding was that at the level of sophistication that we are attempting in Skylab there is really no difference between doing these procedures on the ground and doing them in flight. Could we have the next slide, please.

CONRAD I don't even know what that one is myself. Ah, there's Joe's water bubble.

KERWIN It looks like I'm smoking but I'm not.

CONRAD If you ook inside the bubble there's an air ball inside the water bubble and we found out that we could pump air in and out of the water bubble. We had a lot of fun one night - we called it Joe's blob - and messing around with liquids in zero g. And you could see it's a perfect sphere.

KERWIN It's a lot of fun and you just get some graphic illustrations of some basic physics lessons. A droplet of water rotating in that environment takes on the shape of an oblate spheroid - it flattens at the equator. Also all the little air bubbles in it tend to aline themselves along the axis of rotation with the biggest one in the center. When you fill it with air the air forms a perfect sphere within a sphere so and an so forth. Liquids have an existence of their own up there. It's a new branch.

CONRAD The old CDR doing his arm exercises - as you can see on the bicycle we did remove the restraint harness very early, Joe.

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CONRAD CDR doing his arm exercises. As you can see on the bicycle, we did remove the restraint harness very early. Joe was the one that did the experimenting on that and made all the difference in the world. We were riding that bicycle with the harness on - I guess they computed I got up to 95 percent load on my heart there the first run I made on it and most of that I was expending against the harness. And the harness did two things; it restrained our legs from free movement, and the upper straps prevented us from taking a good normal deep breath as we were exercising. Once we got rid of the harness, why, we rapidly adapted - it was different muscles required to ride the bike in zero g. We rapidly adapted to that and, I think, got back to our baseline. If not, maybe a couple of beats better than baseline towards the end of the mission. Could I have the next slide please. And there riding the bike without the restraint harness, just holding onto the handlebars. This was an exercise period. As you can see, I'm not instrumented, so this was just during one of the exercise periods. Have the next slide please? There's Joe's blob again. This was the M512 metals processing furnace and I don't remember - Paul do you remember which thing we were doing then. Were we doing the exothermic or were you doing it?

WEITZ No, that's when we were prepping for the sphere forming.

CONRAD Yes. You can see one of the pressure suits. We did relocate the stowage for them and there's one right behind our heads there. Have the next slide please. There's our friendly screen. We'd go up every night and find items. Joe lost one of his blood drawing syringes there. A stray nut or bolt we'd have around that would sneak out, most of those were launch bolts that we'd removed. Could I have the next slide please? You want to tell them about that one, Joe?

KERWIN This is the ED-31 high school experiment in which the investigator launched a number of different types of bacteria in the dried form so that their growth was retarded and at a suitable time in the experiment. I activated it by putting it on his moist agar plates. We incubated nine of them. Six of them we grew at ambient temperatures. We photographed them at intervals during the growth period and then again retarded their growth by chilling them and returned them home. The investigator, at the same time, was running his ground-based control on the ground. I don't have even a preliminary report as to the comparison between the two, but it was a most straightforward, interesting experiment and we were glad to be able to do it.

CONRAD The next slide please. Can you focus that one?

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CONRAD Now, there was a great deal of comment. This is one of the S190A camera lenses. We had a lot of discussion back and forth with the ground. If you'll notice right down in here, you can see the flecks. And we were concerned that the lens was dirty. That's an inner lens that those flecks are on. There's no way that we could clean them and I don't know that we determined what they were at this point. We've got to look at the backup hardware, but as best we can tell from the photographs we have no degradation in the photographs at all. We don't know whether that's normal or not, so we brought that photograph back for them to look at. You have anything more on that, Paul? Did you hear anymore - -

WEITZ No.

CONRAD Could I have the next slide please. Here's a shot of the Cape. Now, this was taken with the interior film, surprisingly enough, with the 300-millimeter lens and I guess that's why - you're all familiar with the Cape, it will give you an idea of the detail. Yes, I think it's reversed too. It is reversed. There's pad A - B - it's in the wrong place. The slide's backwards.

WEITZ Maybe all the geography slides are backward.

CONRAD Yes. Could we have the next slide please?

WEITZ That's backwards.

CONRAD Yes - well, you want to tell them what that is.

WEITZ Well, it looks different when it's reversed. That's the entire Rocky Mountain range. It extends from the Laramie and Medicine Bow ranges up in Wyoming all down through the Sangre de Cristo and San Juan Mountains in Colorado. Now, we're looking south - although it looks like it's north - we're looking south and Denver is in the region - I can't really make it our from here. How do you turn it on.

CONRAD Just push the button.

WEITZ That ought to be Denver right about in there I think.

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WEITZ Is in the region, I can't really make it out from here. That ought to be Denver right about in there, I think. This being in the region of Pueblo right in here. Could we have the next slide, please. That's backwards. Geography isn't much fun backwards, could we get those turned around? There you go. That's better. That's the Denver area right in there. I never really noticed it flying around that dark area that looks like just south of Colorado Springs, and I've forgotten what river that is - the Arkansas - whatever. Anyway they say it extends from Wyoming up in here all down into southern Colorado. Next. There we go.

CONRAD Yes, most of these pictures we are showing you are pictures that are taken of parts of the United States that we've never flown over before on any of the other flights.

WEITZ This is obvious to most people. This is the Cape Cod region. Is that Boston there, Joe?

KERWIN A little further up.

WEITZ Have I lost you?

KERWIN Yeah, a little further up.

WEITZ A little further up and most of the state of Rhode Island. Here's Boston. This is the state of Rhode Island in here with the Quansan Point, Hartford region and obviously this is the eastern end of Long Island. These are out the window - these turned out much better than we expected. They are out the window photographs with the Nikon shooting interior film at a ASA setting to be processed for exterior shots and I think they turned out pretty well. Next, please. Okay. All right.

KERWIN Where is the 190 stuff?

WEITZ Oh, I've got you. Let me get oriented. Where's my gouge. No, no - no. This is the Puget Sound area. There's the very tip of the Olympic Peninsula. This is the inlet - the Straits of Juan de Fuca in here. This is the San Juan region is in here, Whidbey Island down into Seattle. This is Mount Rainer. Up here is Mount Baker and there's Vancouver Island with the city of Vancouver up in here. Now we had, unfortunately our best passes over this part of the country very early in the flight when we were doing other things and didn't really have an opportunity to take out the window photographs but nevertheless, this is as Pete pointed out is a region of the country that we've never got a look at before. Next please. These are the Olympic Mountains in there. Next. And this is the Great Lakes. Trying to get oriented here. This is Lake Michigan in here which - is that Milwaukee about there or up in here? That would be by Green Bay up in there I guess.

KERWIN Yeah, I think you were right the first time. We don't quite get Chicago.

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WEITZ Yeah, not quite. This is the state of Michigan. The northern part of Michigan up in here. Next. This is the Great Salt Lake which as you can see it was very unique - it was much more distinctive in flight. This railroad bed across here which splits the lake into and you can see the difference in colors. One end is brownish yellow and the other end is quite green. And that's obviously the great Salt Lake desert. Bonneville Flats are about in there as I remember. Next. This is the western tip of Lake Superior with Duluth being here and there's not quite enough light here but you can see some discharge from what apparently are some steel mills in this region and what doesn't show up here is along this southern shore of the lake you can see the affluent spreading along the lake shore for some 50 miles just for the crustery examination. And obviously a distinctive appearance up in here we start getting up into the Canadian shield. Next. Where are we?

CONRAD It's a big city.

WEITZ Yeah. I think this is Detroit. This is going into Lake Erie. I'm pretty sure this is the western end of Lake Erie. No this is the western end of Lake Erie, excuse me, right. We're looking the other way. This is again the plume. This is the city of Detroit here and you can see where the garbage from Detroit goes. It goes into Lake Erie. And Toledo and Sandusky in here apparently in better light. Now you can see some discharged plumes here and you can see some coming out of here. I'm not familiar - that smear is the end of Lake Erie. One of these is the Maumee River and the other is coming out around Sandusky. Next. That's San Francisco, one of the best pictures. This is an infrared photograph from S190A. There's the Golden Gate, right in there. This is the southern end I think right there may be Moffetts Field, I'm not sure. And, of course, the city of San Francisco there, Oakland over there. You see Treasure Island. I think that's Treasure Island and Alcatraz ought to be about in there. We can compare this with the - next - I'm still trying to decide if that's IR or not.

CONRAD I don't think so. I think that's regular color.

WEITZ It may be. Next photograph, please. There's the IR, right. You can see obviously that all the vegetation shows up red, in the infrared. And this was taken at the same time as the other photograph. The big thing you can see is the appearance. They've got some salt settling ponds at the southern end of the bay. If we can, if you just look at the apperance here in infrared and can we back up one slide and see the difference in the appearance in color.

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You can see many more patterns in this region. It's still not as distinctive as it looks on the table though. Next, please. This is southeastern Utah, as I remember, isn't it? I hate to say. I forget the name of that lake. Lake Powell. Thank you. But we've gotten some tremendous photographs from the Earth resources group both S190A and S190B.

KERWIN The detail is fantastic on these - on these negatives. You look at them with a magnifying glass and you can just about read the candy bar wrappers.

WEITZ The thing that's really amazing - that surprised all of us, we looked at it on the light table with a little magnifying glass - with one eye you still get a three dimensional stereo effect. I don't understand that. It must just be the depth of feel in tremendous detail as Joe pointed out. Next. This is the Lake Meade area. And that portion - I guess that's Las Vegas about in there, huh?

KERWIN Un hun.

WEITZ And Edwards ought to be, or Ellis up in there and the Colorado River running on down through there. We're looking up toward the north-northeast in here and we had many many of our EREP investigators of course interested in sites around here so we hope we got some good data from them. I don't know what this striation -

CONRAD Looks like a thumb print.

WEITZ (Laughter) I never thought of that - I was thinking of a strip mining and everything else - may be a thumb print. Next. If it is - it's not on the original. I think that's Saint Louis. I think that's a confluence of Missouri, Mississippi and Illinois - whatever runs together up in there now it's hard to tell from this angle. Where's Saint Louis. Right in there.

CONRAD Yeah, I think the tail of your arrow is there. Somewhere in there.

WEITZ May be.

CONRAD I don't know, but at Lambert there's a graveyard at the end of the runway we're all familiar with. Landing up there many many times and in this photograph with the spy glass you can make out the graveyard headstones loud and clear so they are really good photographs. They are really super.

WEITZ This is obviously after the flood waters have receded. The pictures I saw the floods were in aviation week but there was significant flooding in that region. Next photograph, please. Have you got any more - This is Louisville - Cincinatti I believe in here - should be the Ohio River going down through there. I'm not personally familiar enough with geography to point any of it out. But whoops excuse me but I think Louisville if I remember right up around in here just before this big series of bends starts. But again this is a region that we didn't have before. Next, if there is a next -

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CONRAD I'll say one comment. I think we were very luck to get these. I've been 4 trips into space, and I think it's the worst worldwide weather that I've ever seen. The weather around the world for most of the 30 days was generally clobbered, all most land masses.

WEITZ It was amazing the amount of clouds all over the globe, it really was.

CONRAD Well, we'd like to open it up for questions.

PAO Okay, we'll take the questions.

QUERY You all look fine, but we wonder really how you feel now. I'd like to ask a personal comment from u Pete, and Paul, and then as a medical opinion and professional comment from Dr. Kerwin.

CONRAD Well, as of yesterday, we're on our second games of paddle ball. I'll admit we found quite a few muscles that we hadn't been using up there. And the last two days is our first really get back to exercising other than the medical protocol. I think that basically there was a little confusion as to exactly how we felt subjectively when we got back. I think it was kind of the old story of 10 people whispering the story in each others ear and it comes out the far end a little bit different than the way it actually started. The term dizziness was used for all 3 of us and I think that was an improper term when we first got out. I believe, and I'll just speak for myself. In the analogy that I used immediately after getting in the SML on the ship was that one g was making my gyros feel like I had just had a 10-g run on the centrifuge and that maybe I was at 3 or 4 gs when I moved my head. I would describe it as the 1 g gave me some sensations of vertigo, but not dizziness. There is a distinct difference between dizziness and vertigo. When I first moved my head in a circular motion out in the spacecraft, I had the sensation that the spacecraft was moving, which was not true. And this is a distinct feeling you can get on the centrifuge at two or three g if you do the same thing. All that tells me is that we had 28 days of not having a gravity vector on our system, and that it was going to take a little while for us to reorient to having the gravity vector back again. It disappeared - the vertigo sensation disappeared to me completely by the next day. However, I still was not used to the fact that my legs weighed so much weight and my arms weighed so much weight. And it took a while to lose the heavy feeling of our arms and the fact that when we stepped - almost had the tendency to shuffle my feet because I didn't realize I had to lift them up and move them out. Otherwise there was no doubt about it, our hearts had gong to a much lower mode because they did not have to work as hard, and

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all our heart rates were running higher. But I guess the lasting sensation, and only if I think about it, is my heart rate has run a little bit higher at all-levels rest, sitting standing, and at exercise, than prior to flight. And as of our M092, 171 run, I feel that we've made a significant improvement all of us towards being back to baseline. I ran again yesterday on the bicycle, and you took my heart rate and it was about 144, which is very close to my baseline heart rate on the exercise protocol. And I don't think that this is unexpected. I think we would have had to spend 4 or 5 hours a day in exercise, both muscular and cardiovascular, to maintain the rate that you just get sitting and walking and living in 1 g 24 hours a day. I do think that the bicycle ergometer, and the exercises that we did with it, contributed significantly to our well-being up there. And I don't think had we not had the bicycle, I'm convinced they would have carried us out of the spacecraft rather than us getting up under our own steam and walking. And of course we were the first to reccommend, and I believe the doctors have seen from the data, that the other crew probably should exercise longer periods of time, and perhaps change some of the - not change it but add to the exercise some muscular exercises rather than strictly cardiovascular. The bike really exercises the heart more than it exercises your muscles, Joe can get into that more. But, my total overall impression is I frankly was surprised that we were in as good a shape as we were. And I think all of us were surprised that we were in as good a shape as we were, not only the crew but I think the ground people were surprised too, and that's what we were up there to learn.

WEITZ There is quite a distinction, and I'm not sure we've made it clear and it's subjective, and I think you have to experience both, but we want to make sure you understand you understand the distinction between dizziness and vertigo. And I'm not going to explain it. But, I didn't experience much of the vertigo. And I think that this is just flat a difference in reaction to the postflight stresses imposed by that other big vector, gravity, that acceleration vector that we'd been living without for 4 weeks. I did have some dizziness. However, I want to point out that was present only during - just as I had on the rotating litter chair during flight, as - it came and went. I had some sensations of vertigo, I had some dizziness in flight on the chair. However, it was only while I was exciting, stimulating my inner ear by moving my head aboard ship. If I moved my head down and to the right, which is a pretty good kick after you've been weightless or in bed for 4 weeks, I'd have dizziness. As soon as the head motion stopped, the dizziness went away. I want to make that point very clear. Also there was some confusion apparently as to the feeling of heaviness because I described it, I kept track myself of how high a gravity field I was living in. And it started out when we crawled over the sill at about 3 g, it took about 2 days for it. When I went to bed on the evening of the second day aboard ship, it was down to a little over 1 and I woke up the third day essentially back in one g. However, this is not the fact that I laid in bed with 3 gs pressing me into the mattress. This was only the effect again that was when you moved an arm, or when you went to roll over in bed. I picked my head up the first night, and about then I was still about two gs, and my head was very heavy. As I say, it is like trying to do this thing on the centrafuge. And the other thing, the only real postflight effect that I felt is - apparently we didn't really exercise the calf muscles at all in flight. I tried on the bicycle, I normally ride with triangles adjusted fairly forward on my foot. And I would ride - about half the time I was on the bike in a mode, or I would try to flex my foot up, and push off with the ball of my foot in an attempt to get some exercise in my calf muscles. But after very few times around the track yesterday, I, that wasn't hacking it at all. If you want to get the calf muscles and the back of the leg muscles we need something besides the bicycle.

KERWIN Dr. Weitz, I'm going to take your medical degree back again if you don't get the difference between dizziness and vertigo down by heart.

WEITZ I've got it, I just didn't have time to explain it.

KERWIN All right.

WEITZ For one thing, they are spelled differently

KERWIN Yeah, they are spelled differently. Let me start with a demur. I think it is just as unrealistic to expect us to give you a complete, consistent story of the physiology of space flight, now, as it would be to expect the Earth resources people to give you a complete story on all the goodies they have gotten out of their photography when many of them haven't even seen the negatives yet. We have a number of very interesting phenomena going on. I think I have some understanding of them individually. I haven't mentally been able to put them all together yet. With that demur, llet me speak about the mission briefly in two parts, the inflight and the postflight. Inflight, it was a contInous and pleasant surprise to me to find out how easy it was to live in zero g, and how good you felt. As you know,

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we all reported that we never felt any motion sickness or any truly unpleasant sensations in flight, and that is literally true right from the very first minute. I don't use that fact to deny that there had been some individuals in the past who for periods of time had felt these unpleasant sensations. That just shows you how great individual variation can be, and how little you should really pay attention to it when you are trying to get the overall picture. It was about the 6th or 7th day that I got up in the morning and said to myself, "Golly, I really feel great." And all of you who work out at all know that positive glow of health - -

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KERWIN And said to myself, "Golly, I really feel great." And all of you who work out at all that positive glow of health - that a positive sensation of being in good health. That is present up there. It's easy to move, it's easy to work, there are certain physical sensations that are different, a constant feeling of stuffiness in the head, which really isn't nasal stuffiness. I think it's blood congestion, something of the sort - head stuffiness. But, by and large, living and working up there did not appear to us to have an end point. Now let's look at the medical experiments inflight. Our bicycle experiment, as Pete pointed out, showed no tendency to degrade, our ability to move blood, to move muscles and to work with our heart to accelerate it, to consume oxygen, basically, was not changed and did not appear to be degrading at all in any or us, subjectively or objectively. The vestibular experiences is something a little different and a little special. But certainly we didn't have any problems in that area. In the lower body negative pressure device, we all experienced some degradation objectively on the measurements of our ability to pool blood, to take blood out of the circulation and pool it in the lower extremities, which is what lower body negative pressure does. That, of course, varied between individuals. I probably had a little - had more trouble than Paul that had a little more trouble than Pete, but it was clear that that particular system had undergone a step function change, because this change reflected by an increased heart rate at a set level of negative pressure was different really the very first time we ran the machine and I do not know subjectively whether or not that change was continuing during flight. And that's a surprising statement because in my case the level of negative pressure had to be decreased. But again, individual variability, temperature, time of day, whether or not you'd had a meal, all these things on the ground can affect the test; the investigators know this and this is why they've insisted on the ground that to the extent possible we always run it at the same time of day. I don't know whether there was the continuing curve of change and I don't know what the change was because we haven't had our blood volume studies back yet from the laboratory. So I"m not going to say whether or not there is a decrease in blood volume. I think it's obvious that there are shifts in fluid between body compartments and I would guess - and it's strictly a guess, that in our case, we experienced the immediate fluid loss from the blood in the extracellular fluid that we've suspected all along in spaceflight. This immediate drop in weight reflects that

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KERWIN change. I would suspect that as time went on, we actually made that up. But we probably made it up from intracellular fluid, which accounts for the decrease in calf size, the generally significant drop in leg volume - normal leg volume - in all of us and a change there which is not very rapidly come back to normal. Those are the medical experiment results. In general, we would say, LBNP was not a limiting factor in the case of our flight. This is why we don't expect it to be a limiting factor for Al. We were pooling more blood in our legs up there than we were on the ground. The initial - that is, the initial volume of the legs was low and the delta - or change - in leg volume was higher in all of those tests than it was on the ground, and very much higher right at the very beginning. We feel that as long as an individual can pool a reasonable amount of blood in his legs, whatever negative pressure that may take, and provided his response to exercise, his appetite, his body weight, general feeling of well being and ability to do work continue without significant change, that these missions can go open ended. So much for the inflight part. Now the postflight part simply demonstrates that indeed there are changes and there is a price to be paid and indeed it does take some time to get back to baseline. But we ought to put that in context. Baseline for us is baseline of guys who have been working very hard to get into condition. And it's probably the best shape we've been in in many years. Another milestone that you might want to ask about is, at what point in time after the flight is the individual able to carry out a normal day's work? And I'd say that by Sunday, that is, the R plus 2 day, we certainly were all able and did carry out a very normal day's work. We weren't back to our baseline, but we were certainly readapted to one g.

CONRAD Could I - let me add one medical opinion from a nonmedical person. I think that our experience has been in Apollo when we got to a larger spacecraft - and I'm firmly convinced of this and I don't know whether Joe or Paul is or the doctors are for that matter - but I want to make one statement before SL-III goes off that you should be prepared for, I think. And the statement is that in all our testing of the vestibular systems - the inner ear otolith and so forth - it appears that there, to me, has been no correlation between how a man does now in seasickness, airsickness, carsickness, or no motion sickness at all with respect to how he's going to do when he get to zero g. And what I'm saying is the three of us were pleasantly surprised at having no motion sickness feeling from the moment that we got in the even larger vehicle. However, experience tells me from previous flights that there will still be the possibility that some crewmen are going to

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CONRAD experience some form of what I would like to call zero g motion disturbance that they will have to adapt to and may take them more than the few seconds it took us to get used to that zero g. I still think that people may get up there and even go so far as to throw up because of motion sickness in zero g, but I do feel they will adapt as they stay there. But I think that's just a point that should be pointed out. Individuals do vary. You've already seen that the three of us varied and I think it can still happen.

KERWIN That's right, Pete. And the thing is not to make a Federal case out of it. And, of course, in my case, it struck me that a Federal case was kind of made out of the fact that the old sailor got a very classical case of seasickness on the water and on the ship after the mission and that set me back a day or two in my readaptation. But it's not a big deal.

CONRAD NO, I think that Joe got sandbagged in the command module by listening to previous experience. Some of the people that had flown had a tendency to get seasick in the command module during egress training. Everybody made the statement, "Boy, after tens days in zero g, you plop around on the water and I don't know whether it's because you're excited or because this kills your sensation of motion sickness. I never felt the least qualm about getting seasick and I turned green out there in the Gulf. So, Joe, who has the lowest tolerance by testing to motion sickness of the three of us, - used to have - preflight, he leaped out of the couch right after we hit the water and down in the LEB and was moving his head all around and throwing everything, and I'll tell you it was calm out there, but that's kind of the worst situation for the command module. That command module was really bobbing. And you could see it come over him just liked you'd see it come over anybody on a bobbing ship. They threw down a big glass of sweet cherry drink, we all did, because we wanted some fluid and the sheet just came down. Joe turned green for no other reason than he was seasick. And I think that's a very important point to separate out. And I think Joe set the new milestone. He's the first guy that came back from spaceflight that got seasick in the command module, except one guy I can remember in Gemini.

PAO Bill Hines.

QUERY For Dr. Kerwin. Both the other crew members have made the distinction between vertigo and dizziness and I wonder if you'd give us the medical definition of the two so that we can distinguish between them.

KERWIN Well, since Dr. Weitz refuses, I will make an attempt. Vertigo is a sensation of rotation. And depending on which book you read, it's the sensation that the environment is rotating around you or you are rotating around the environment and in some diseases there may even be a valid distinction

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KERWIN there. But the operation of our semicircular canals which are sensors for angular acceleration is normally subconscious. When it becomes conscious that sensation is called vertigo. Now dizziness is an unpleasant sensation which may or may not be associated with rotation. In motion sickness it is. And it simply implies that nerve pathways to the autonomic system - the vegas nerve and so on have been opened up and that - -

END OF TAPE

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KERWIN That nerve pathways to the autonomic system, the vegus nerve and so on, have been opened up and that you begin to get the pallor, the cold sweating, the stomach awareness and eventually the nausea and vomiting. Those pathways, the early symptoms of that complex, are called dizziness. So there is a very valid distinction. The fact is that on reentry day all of us were constantly experiencing vestibular sensations that are normally unconscious to us.

QUERY Pete could you have gone on and flown an operational 2 or 3 month mission, if that's what had been called for and what specific advice do you, Paul, and Joe plan to give Al Bean and his crew?

CONRAD Very good Jules. Yes, I felt from about day 14 when we passed the milestone of our known flight record, it became very obvious to the three of us, and we had many discussions about it, how well we thought we were doing physically. And certainly we had schooled ourselves for 2-1/2 years to 28 days. Now if on day 27 they had called up and said "surprise, you're going to go for another 60" I'm not sure it would have been a physical reaction that we would have worried about - it'd probably have been a more mental one. However I really do feel that we could have continued. And what we have recommended to Al - that if you look at our day 16 operation on, we had worked with the ground. We had gotten an extremely good, I thought, schedule done. And one thing, I thought, and I can't give you an answer right now because I have not seen the numbers. I don't know what we were accomplishing per day from day 16 on, per the original flight plan. I have the feeling that we were doing almost as well as preplanned. This allowed us an extremely normal day up there. I was really likening it to my previous experience in the Navy on shipboard. I worked a full 8 hour day. There were at least an hour - I'd give it an hour in the morning and an hour in the evening that were spent in tests that were related to our living up there - housekeeping, you know, weighing ourselves, and these things that you normally wouldn't do on ship, say, or normally here on Earth. But it still allowed us a good 2 hours per crewman to have to himself. Now we spent that in various ways. Sometimes we used it to get ahead in the morning for the next day. We'd have the Flight Plan on board and the ground got - as we accomplished more of our daily work per day, the ground Flight Plan came up earlier and earlier for the next day and we were pushing each other for getting ahead and running a nice routine where we were not rushed. And I think the reason - they ran us out of gas and rightly so - we charged the first 6 days - 7 days - you know, I finally screamed help. You've got us going - we were making mistakes - we were going too fast. And we settled into a fairly normal routine after that but then we went back to the EVA and you know we had a few days that were mixed up in there - we were trying to build the EVA gear and get ready to do EVA so I'd say day 16, on we got a real normal schedule that was pleasant to us and I felt that we were accomplishing almost all of what we had preplanned to accomplish per day. And with the addition of more exercise for Al and his guys - and frankly I got to where it really made me feel good. I got to where I wanted to get on that bicycle, especially if I'd run two or three passes at the ATM and I just sat in zero g and floated. Your body tells you - it's smart - it says do some work, pump some blood, it'll make you feel better. And I think that this is individual again. Joe liked to exercise at night and I liked to exercise in the middle of the day, Paul at other times. And I think that if they could work it out scheduling-wise so that each one of those crewmen, to their individual likes, gets a split exercise period where maybe one's on the bike and maybe one's working some muscles and still do the same number of hours on the experiments that we did - they will have an extremely successful and as pleasant as possible in that vehicle. That vehicle is very pleasant to live in. I think we were all surprised at that. It was extremely - but the other thing that I would like to add starting on about day 16 I managed from then on to polish off 3-1/2 books in my spare time. We had the opportunity to go to bed and read in the evening and all of us did that. All of us found that each one of us required different amounts of sleep in the evening. For the day, Paul was the low man - we called him the night wanderer. He ran on about 4-1/2 hours sleep a day with no degradation in his performance. Joe and I ran 6 to 6-1/2 hours per day and all of us are lower than what we sleep here on the ground. We used those times to look out the window which was always pleasant. It never changed in my four flights. So I think that, as I said earlier, if we can show that Al's crew can accomplish most of their mission on the kind of schedule that we have and we give them the confidence that we enjoyed it, I think they're going to have an extremely successful mission and my guess is, as I've always said in the past, the next one should always be better. And I think it will be.

QUERY Dr. Kerwin is there any possibility at all that, while you subjectively feel fine in space, that your physical condition might be deteoriorating and you were unaware of it?

KERWIN There is always that possibility and I made the demur that you know you really want to look at the data and I would make another demur that before I sent guys up there for 6 months I'd want to look very carefully at all the Skylab data and try - and intelluctually put it together. The interesting thing about being up there is the position is that you get a look at a body that's undergoing weightlessness from the inside. You get the subjective sensations and you can't ignore them. And what presently surprised me so much was that the subjective sensations were so pleasant that one felt really normal. That's what encourages me. I say we don't understand this whole thing. Heck, we don't even understand the common cold completely and it'll be years before we do. But I'm very optimistic.

QUERY Did you get on each others nerves? Did you have any difficulty getting along. At any time during the flight, did you just want to get away from each other and sit by yourself in a corner somewhere?

WEITZ Of course, we had the opportunity to do that. Someone asked me a similar question before flight, you know, what are the psychological problems and implications of a long-duration, isolated, confined, et cetra and so forth mission. And my answer was that there are certain built in safeguards against psychological problems in a mission like ours. Selection, long training, long familiarity with one's crewmates, good motivation, a busy schedule and good leadership. And we had all those and they worked.

QUERY I have several but I'd like to take one at a time if I could. First of all, I'd like to clear up something from early in the mission, the SEVA - we got the mental picture that the arrangement was this - we had Paul hanging out between the two spacecraft with Joe grasping his boots or his knees in the command module hatch, RCS firing on the service module and TACs thrusters firing on the lab, with the effect that Paul and Joe's arms were the length of a chain, a human chain, in a tug of war between the two vehicles. Is that a correct impression?

WEITZ I'll correct it. I was out of the hatch, up to about my waist, I guess, because apparently we couldn't have been urged too strongly to stay away from the service module RCS impingement problem on the suit and Joe was holding my feet only for stability.

CONRAD We had the quad A forward-firing thruster, the one that is aimed right at his back, turned off. So we were operating with 15 out of 16 thrusters - they did not want Paul to get any higher than his waist, though, because the side-firing quad A thrusters - you still have the normal shock out of them - had he gotten up far enough they felt they could get some impingement from the side - the roll thrusters. But I don't think you ever were aware of any impingements were you?

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WEITZ No. I think where the confusion may have come was that when I - I didn't really get a good look at those movies until this morning and Pete said that that wing did bend when I heaved on it and apparently it did. At least it showed up in the movie. At the time I didn't think that it did. But I temporarily jammed the hook in under some portion, under the beam fairing. I pulled the two vehicles together, at which point then, the TACs thrusters did fire. As we started to come together, Pete saw this and started to back off. When he started to back off the TACs took over and thrusted and the workshop started to move away -

END OF TAPE

WEITZ - - Pete saw this and started to back off. When he started to back off the TACS took over and thrusted and the workshop started to move away. So he had an opering rate - The hook was caught under the beam and thethered to the spacecraft, not to me. I wasn't going to hang on to that thing. And it was tethered to the spacecraft. That was the time, and I don't know whether it was live at the time or not, that I asked Joe to stand by to jettison the pole if we had to, because it is on what we call a monkey bar near the hatch, and what I didn't want was a high load there to upset Pete's attitude - our attitude as far as that goes. I didn't want to perturb what was going on by, as I say, putting an attitude perturbation in there. But - -

CONRAD We had a rapid means of jettisoning the tether. It had a - it had a quick - release on it and Joe had charge of that - maybe it's not quite clear to you. We had removed the center couch, stowed it under my couch, and Joe was actually facing the hatch. In other words, he was - his back was to the LEB and he changed the tools as Paul handed the pole down in and we could leave the pole sticking out, and then the pole had a tether on it that went around this monkey bar that had a quick - release, and that was our one little moment where we almost jettisoned everything because we did close very close to the vehicle. And as Paul said, when I fired aft that perturbed the workshop. It fired its TACS and we started drifting apart fairly rapidly, and I got on the thrusters pretty good and started back in again. We had a little in and out and a little hollering and pulling and I'd say Paul got a pretty good load on the SAS wing. I could see it quite clearly from my window and he flexed it a good foot.

QUERY I'll try to make these fairly quick ones. First of all, I know you can't answer this with anything like scientific objectivity, but how do you feel now about the possibility of I'd say a two-year mission to Mars?

CONRAD You want to answer that, Joe?

KERWIN Objectively again, I do not know in my own mind whether zero G or rotation is going to be the preferred mode for a mission of that duration; I just don't know.

QUERY Let me clarify the question. How would you feel about doing your mission to Mars based on what you've experienced so far?

KERWIN Oh, I see. Okay, I am confident that in the - in the area of physiology we're going to be able to work it out; exactly how, I'm not sure. I wouldn't want to go to Mars and back for two years on Skylab. I miss my

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HUTCHINSON As far as real time - of course you know the VTR will be filled up, which is 30 minutes worth of television. And as far as real time television, the EVA is scheduled such that providing the preps go on time, hatch open will occur over the States with live television. Television as I - as best I know is going to be taken from inside the vehicle by the third crewman looking out either the STS, probably both the STS and the command module windows. We will have two full stateside live television passes while they are out. One right at hatch opening, and one right in the middle of the EVA. And those passes will probably be on the order of 20 minutes in duration. And in between that time, there will be a selected EVA activities put on the VTR until we fill the VTR up, which is 30 minutes worth. So all told, that means television coverage there will be probably an hour and 15 or 20 minutes worth of TV connected with the EVA if you add the VTR and the real time.

QUERY How is the coolant loop doing especially for the EVA?

HUTCHINSON The plans for use of the coolant loop during the EVA - I told you we had this - still have this little troubleshooting procedure to go through on the water removal system, the condensate system, and that hasn't been done yet. That will be done today, but that's connected with the coolant loop in a remote way. The coolant loop configuration is as follows: we will use airlock module loop 1, and suit umbilical system 1, with all 3 crewmen on the one loop. And loop 2 which is the one we - airlock module loop 2 which is the one we think has the TCV - -

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HUTCHINSON - the TCV valve hung at about 46 degrees will not be used, nor will its configuration be changed. The only configuration change in the primary loop is that we will run both - two pumps in the primary loop. And of course, as you recall, we did an EVA - The last EVA we did we did on a single coolant loop. The theory being that loop won't - that airlock module loop 1's working very nominally. We've also demonstrated that we can bring the suit umbilical system on to airlock 1 without any problem. We did that in flight here, a couple - 3 or 4 or 5 days ago - something like that. So that's the coolant loop configuration.

PAO Okay, no more questions. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 17, 1973
15:42 p.m. CDT

Participants:

Milt H. Windler, Flight Director
Bob Gordon, PAO

PC 60

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Time: 15:42 CDT
6/17/73

PAO Okay. Milt Windler.

WINDLER Okay. Well, it was a pretty quiet day. It seemed like to me, anyway. In fact I was amazed at how quiet it was. We had no real problems with the spacecraft. For a while there we had a little trouble getting the S073 retracted to the SAL, but Paul Weitz apparently was able to fix it. However, he did that apparently by - by tapping it gently on the side of the spacecraft when he - when he brought it back as you probably heard. The - there may be some connection between the RCS trim maneuver and the - and the problem with the S073 although we really don't know that. But otherwise basically all the equipment is going well. The EVA plan is progressing. We added a - plan to add a little touch of - extra touch, and that's put a piece of the sail cloth - the JSC sail out where it can be in the Sun and - and let it be there in the thermal environment and evaluate it after some period of time. In addition to that, of course, we're going to try the tapping operation on the CBRM 15 and see if we can jostle it back into operation. And also plan to - to do the dusting of the little particle on the white light coronagraph in addition to the normal film change. Those procedures have just been reviewed in the Control Center which is why I'm late, and we are in the process of up-linking those to the crew now. So we expect to have some comments back probably, I would guess tomorrow from the crew, although some may come down tonight. And that's about where we are. The trim maneuver was - was accomplished this morning and it was a fairly simple operation and no real big problem with that at all. So I'll answer any questions that you might have, or try.

QUERY Do you have a time line for the EVA, Tuesday?

WINDLER No, I don't. We're still working on that. That'll probably be available later on tonight though, or this afternoon. I assume you want specific times?

QUERY Yeah.

WINDLER Yeah.

QUERY Also, could you give a rundown on the Flight Plan for tomorrow?

WINDLER The Flight Plan for tomorrow includes medical runs on both the Commander and the SPT. And other than that, it did include a - a - using the ATM to look at the dark side - the night sky, but we did cansel that for tomorrow because there was a lot of discussion still about what was the best target to use. And we were not able to

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completely evaluate it in terms of - of the momentum usage, so we felt it was better to - to not plan that pass right yet. And we also came up with about 30 things to go in that little spot so I don't know what's going to go in there ultimately, but it was a probably about a 30 or 45 minute block of time there that we'll do something else with. I think those are the major things, there may be others. I don't know - remember any offhand right now.

QUERY We do have a preliminary outside?

WINDLER Which is - except for this one thing I mentioned to you, is pretty accurate. In fact, this represents the thing we sent to the crew.

QUERY How far does the astronaut have to go from the normal Sun end or the center work station on the ATM to tap that CBRM 15?

WINDLER I guess I don't know the answer to that. You're looking for feet or something like that - -

QUERY How far does he have to move away from his handholds or restraints or any - -

WINDLER I - I don't know.

PAO Paul, I'm sure our Marshall people outside can get that for you.

QUERY You going to close out the ATM tomorrow? Is that tomorrow?

WINDLER Yeah. Closing it for unattended operations of course.

QUERY Right.

WINDLER Yeah, normal closeout.

PAO Mr. Reeser.

QUERY You may have done this in detail before I got here but - -

WINDLER Probably didn't.

QUERY Could you go through the EVA step by step so far as you have it worked out at this time in some detail?

WINDLER Well, no. I really can't because I don't know exactly where it's going to be. We've allowed about 2 hours and 20 minutes or plan to allow 2 hours and 20 minutes for the premission - - No, that's not what I want to say. Let me start all over again. Tomorrow evening there'll be about an hour and 3 quarters for the EVA prep. Very similar to the first EVA where the crew will get their gear out and get it all stowed in the airlock as best they can and - and get a advance start on getting the equipment all prepared. Then the morning of the EVA there will be a 2 hour and 20 minute period much as was done on the previous EVA, where they'll actually put their suits on and make the - -

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WINDLER -- will be a 2-, hour and 20 minute period, much as was done on the previous EVA, where they'll actually put the suits on and make the last checks of the gear and get all the exact cooling loop configurations, etc. And then we'll open for probably for a 2 to 3 hour period and I don't really know exactly how long that'll be right now, to do these activities that I described and I guess before you came in I was saying something that you may not be aware of or perhaps you are. Plan to put out a piece of cloth from the JSC sail to allow it to see the same thermal environment that the parasol is now seeing and also of course, that the other sail will see when we put that out after we get these on Skylab III. I don't know exactly how this works there at the station contacts, so I don't really have the exact schedule, precise hours of starting time, etc. And the post-EVA operation will be essentially nominal.Basically this is very close to the nominal EVA, other than the fact that we have to take along a couple extra tools in order to tap on the CBRM and we do have to cut this patch of material and take it with us and fasten it to the spacecraft. The basic procedures are not, you know, it's essentially transferring the film mode, installing it and bringing the film back. So and the postoperation is almost identical, too. The difference would be in the night before, in getting some of these other tools assembled and all the tethers secured and that sort of thing. But actually, once we start the EVA day, I think it will be very similar to the nominal EVA that we've already been advertising.

QUERY What other tools have you taken with you?

WINDLER I don't have a real good list. There's a hammer device to tap on that, - bang is a better word, on that CBRM. And we do have indications from some prelaunch testing that, an also some work that's been done since then, I guess that's been described here before. Hadn't it? They did do some instrumentation on the relay and try tapping on the relay to see how it affects the other electronics etc., to verify that you could do this without hurting the equipment. So that test has been done. But I started to say, that there have been occasions premission, where the relays would chatter, stick and by mechanically jarring them loose you, we could restore the operation.

QUERY Could we kind of get real basic on this? Is he going to do the film transfer first and this other stuff afterward?

WINDLER Uh, I just sat there, and for about 2 hours I've been looking at a pad and I really, sounds strange, but I can't tell you whether he does the film first or the CBRM first. But, I believe that he does the CBRM. We can - I can find out, I guess, if you need to know that.

QUERY Okay. Well, can you just go through the basic movements that are going to occur for each one of these operations, I mean for when he goes up and gets the film, how long's the ladder and etc., how he gets back in to the spacecraft and then about the tapping on the other thing?

WINDLER You mean handing the film trees and the whole - all that kind of stuff there? No, I don't to tell you the truth, it's all in the checklist and I've, really haven't, I couldn't tell you exactly. They basically - well, let me tell you what I can, and you tell me how much more you want to know and we'll find it out. They, - one crewman gets out and they hand the film out and they fasten it to the place to secure it outside of the SAS area. And then they use these booms, they extend the booms and the other crewman moves out to the Sun end of the, or to the next work station really. On the Sun end of the ATM and they pass the film trays out to him, they rotate - well, they start out where they are, and change the film and rotate it to the various positions to change the film. Pass it back on the booms and put it back inside of the airlock compartment. Now I don't know if that's the kind of thing you're looking for, or if you want to know the other five steps that it takes to do each one of those, or not?

QUERY Okay. How about when he goes down and plays mechanic with him ham - -

END OF TAPE

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WINDLER How I don't know if that's the kind of thing you're looking for or if you want to know the other five steps that it takes to do each one of those or not.

QUERY Okay, now, how about when he goes down and plays mechanic with his hammer?

WINDLER Well, I guess I'd have - I don't know if I can describe that to you on the model or not. I've been looking at a drawing that's laid out flat, but basically there are - these CBRMs are - I believe it's four of them to a package, but there are several adjacent to one another - and we've sent him a message that - on a teleprinter - a map that outlines which one of these particular bolts that hold the outside plate on that he's to tap - an Allen screw, exactly. And the particular one he moves over to and tries it with his hammer and they see if the relays will activate, and if they don't, the contact activates and gets the CBRM back on. We're prepared for them to do that three of four times, each time checking the relay to see if it is now back in operation. And I would guess just from people - why, he'll probably - he'll start off maybe not hitting it too hard and he'll gradually hit it a little bit harder.

QUERY Are there foot restraints or hand restraints or something to hold him there while he's banging away with his hammer?

WINDLER Yes, there are hand restraints that he can hold on to. Now, the other places are foot restraints, but I don't think there are any foot restraints in this area here.

QUERY Then when he attaches the part - the fabric from this JSC sail - how is it going to be attached? Where is it - -

WINDLER I don't know the answer to that. That just came up this afternoon. It'll probably be fastened around one of the strut-type devices and - the intention, though is to get it where it's part in the Sun and part in the shade so that you can distinguish between the two areas that are exposed or not exposed to the Sun. And I don't even know if we should even try to tell him exactly where to put it anyway. He might be able to find a better place than we can tell him, just on his own.

QUERY Will Conrad and Kerwin carry out this EVA?

WINDLER When I left here - and I didn't ask anybody today. Weitz was going to do that. Is that - did we agree to do that?

SPEAKER We'll try to find that out for you.

WINDLER We speak of them as EV-1, 2, and 3, and I don't which way they've assigned it. Yes, it would show to be one of those three.

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WINDLER But it was going to be Conrad and Weitz that were going to do it when I left and I didn't even ask that question when I got back today. You'd think I would have done that, but I didn't.

PAO Okay, we'll ask that question from for Milton.

PAO Any - Paul?

QUERY The TV - as I can see - -

WINDLER I'm surprised that they haven't announced that. I thought you could tell me.

QUERY They had said when there was going to be possibly two of them - that Kerwin would be one and Weitz would be the other.

WINDLER Yeah, they're going to trade off.

QUERY On the TV, is that going to be out the window just like it was on the wing TV the - or wing EVA the other day, or what?

WINDLER Well, I guess it'll have to be. I really haven't paid much attention to the TV aspect of it.

SPEAKER You mean out the STS window?

WINDLER Yeah. But the normal place for the TV is, of course, - is occupied.

QUERY I heard that someone - someone mentioned that they were kind of nervous talking about taking the camera out this time. You don't know anything about that?

WINDLER No, I don't.

PAO Okay, fine. Thank you, Milt.

WINDLER All right.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

TV Tour
Johnson Space Center
June 17/1973
11:35 a.m. CDT

Participants:

Bruce McCandless, Backup
Doug Ward, PAO

SL-II PC-59A/1
Time: 11:38 CDT
6/17/73

PAO This is the Johnson Space Center briefing room. And we're ready, at this time, to begin our replay of the television - of the tour and also the replay of the demonstration of the trash airlock and also the restraint shoes used by the crew. We have Leiutenant Commander Bruce McCandless, who will give us a narrative, particular during those portions of the tour where the audio was bad. And we're ready to roll that tape now.

McCANDLESS Okay. The tour of the orbital workshop, as presented last evening, commences in the multiple docking adapter. That is the forward-most section of the workshop proper. It is to the multiple docking adapter that the command module mates and the crew transfers through into the area in which you're observing now. You're looking at the pilot, Commander Paul Weitz, speaking through a light-weight head set with the umbilical from that headset in the foreground. On your screen left is an assembly of six multispectral cameras used as a part of the Earth resources experiment package. Weitz is pointing now at the eyepiece of the viewfinder tracker system, which is used for pointing an infrared spectrometer at small selected targets on the surface of the Earth. The Earth resources package is a collection of sensors covering a wide range of optical and infrared band-widths designed to gather data on those techniques that are most effective, for future applications in gathering information on crop resources, and geological features, information regarding the atmospheric conditions here on Earth an sea-state and meteorological conditions at sea. Paul is now opening up the cover on the control and panel for the total Earth resources experiment package. Normally, this is a 3-man operation. One crew-man operates the controls for the majority of the experiments from this majority of the experiments from this panel. The second crewman operates the viewfinder tracker system for the infrared sensor, and the third crewman operates the metric camera from the anti-solar scientific airlock that's in the side wall of the forward experiment compartment down in the workshop proper. You'll note the ease with which Paul Weitz is maintaining himself in position. He's hanging on by wedging his feet into the knooks and crannies in this particular area, one hand free to operate the equipment and the other hand free, in this case, to hold his microphone. He's now translated over into the vicinity of the tape recorder, he's opening the tape recorder cover. The bulk of the earth resources data is returned either on photographic film, or recorded on magnetic tape, for a later playback on the ground. We have two data tape recorders on board, associated

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with the earth resources package. Either one of which can be used, the one providing a backup for the other. Behind Paul, you see the section of grid work, which provides a more positive restraint for the operator of the control and display panel should he desire it. Later on in this sequence of recorded television, you'll see the triangle shoes, which are designed to interface with such grid work and the grid in other locations throughout the workshop. Paul's describing now, the video tape recorder installation on which the tapes which you're now viewing were recorded. Since the Skylab is in a low-earth orbit, communication coverage with the ground stations is of necessity limited by line-of-site configurations. A typical pass is 10 or 11 minutes long, and when the spacecraft goes below the horizon, the radio signal from it is cut off. Consequently, to record programs of any significant duration, we have to resort to an onboard tape recorder. You may be interested in knowing that this video tape recorder installation is the same - -

END OF TAPE

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McCANDLESS - - signal from it is out off. Consequently, to record programs of any significant duration, we have to resort to an onboard tape recorder. You may be interested in knowing that this video tape recorder installation is the same package that will be used in the Apollo-Soyuz test mission for recording scenes from that joint mission with the Soviet Union. The low earth orbit was selected in order to maximize our capability for making scientific observations in connection with the Earth Resources Program, to keep the crewmen below the radiation coming from the Van Allen belt and other radiation belts that naturally encircle our planet, and to provide a compromise on lifetime of the space station that is high enough to be in a low-drag area, and the minimum requirements for fuel necessary to get to it. In the background you see Joe Kerwin, Navy Commander, Flight Surgeon, and Pilot operating the control panel of the Apollo telescope mount, which looks at the Sun in the X-ray and ultraviolet regions of the spectrum, as well as examining the Sun's corona in white light. These experiments can only be performed from an orbital location, since our own protective atmosphere very effectively screens out the ultraviolet and X-radiation and protects us from it, and the atmosphere and particles in it scatter the light coming from the corona, making it impossible for us to observe the corona here on the surface of the Earth except during total solar eclipses. As we zoom in you'll notice that Joe has two television monitors at his command in the middle of the control and display panel. These are looking at the Sun in the hydrogen Alpha line right now, which is a red light line. The image appears to be rolling down. This is caused by a synchronization problem, in that the onboard television camera and the shake generator for the displays that the Apollo telescope mount are slightly out of phase and give you this rolling motion that you may be familiar with when the vertical hold control on your home television set is slightly misadjusted. The actual display of course, is quite steady. He's restrained in a small chair with a lap belt. Also, has available a restraint technique using the triangle shoes for his feet to keep him in position. This seems to be the most effective way of restraining yourself for long periods of time at the panel and having both hands free for operation. Paul Weitz is now moved back to the structural transition section, that is a forward part of the airlock module proper, and is explained in the operation of the caution and warning system. Over 76 separater parameters, that is, separate quantities within

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the workshop are continually monitored by the caution and warning system. Should anyone of these parameters go out of limits, a light and a tone is sounded to indicate that there's a problem. Paul has just pushed the test switch turning on a large bank of the - turning on all of the warning lights. You see the warning lights illuminated in the right hand part of your screen, Paul just pushed the master alarm light which resets them and turns off the tone. He's now going to demonstrate the operation of what we call the Delta-P switch. The Delta-P sensor senses the Delta to the pressure, that is the rate of change of workshop pressure sounds the clashing that you hear in the background, if the pressure is decreasing at a rate rapidly enough to indicate a leak. He's now activated the fire alarm. We have a multiplicity of fire sensors scattered throughout the vehicle, anyone of which will turn on a light indicating it's location and sounding the fire siren and allowing the crew to take effective response. Later on in the tape you'll see the fire hose down in the workshop which you would use in combating such a fire. The unsung hero behind the scenes right now of course, is Commander, Pete - Captain Pete Conrad, the commander of the mission who's operating the hand-held TV camera pointing it at the scenes as they're described by Paul. He's now describing the location of what we call a molecular sieve. These units supplied in redundant pairs, circulate the atmosphere throughtout the vehicle through a - an adsorbent canister, thereby allowing you to mechanically remove the carbon dioxide from the atmosphere and to dump the - -

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McCANDLESS - - through a, - an adsorbent canister, thereby allowing you to mechanically remove the carbon dioxide from the atmosphere and to dump the carbon dioxide overboard selectively, thereby purifying the atmosphere. Paul, has just made a joke, in that he was describing the fact that this was known as molecular sieve A and the other molecular sieve B, and he looked up to see that Pete had pointed the camera to molecular sieve B, and was surprised to find that. Looking inside the, the external package, you can see part of the workings of it. In the lower left hand corner, is a solid strap backed up by the activated charcoal canister, which serves to remove odors and other contaminate gases from the atmosphere that are not effectively taken out by the CO2 scrubber system. Paul is translating aft, that is, away from the command module, down into the airlock proper. This section of the larger airlock module is a section approximately 5 feet in diameter and about 10 feet long, which can be shielded off from the rest of the workshop, depressurized to vacuum independently and allow 2 crewmen to go out into the vacuum of space on an EVA or spacewalk through a Gemini spacecraft hatch mounted in the side of the airlock section. Inside the airlock are the fittings and connectors necessary for hooking up the umbilical, which supplies the crewmen with oxygen, with cooling water and with electrical power to support them during their spacewalk. He is now back at the aft-most mol section of the airlock module, and is mentioning that we will change the location of the color television camera in just a moment and pick up the balance of the tour, looking down into the workshop. We have done that, with a momentary splice in the tapes. You're viewing Captain Pete Conrad, the mission commander, as he translates the restraint location on the dome locker ring, down in the workshop proper. He has anchored his feet into a circumferential ring of grid work with triagular holes in it, putting the triangles through and twits and locks them in place. We've had some difficulty with the audio, so I'm going to continue with my narration. He's describing the fact that the lockers contain miscellaneous supplies used during the mission. EVA equipment, spare sleep restraints, Earth Resources Recorder tapes, things of this sort. Down below the lockers are 10 water tanks, which contain the water that is used for drinking, food rate reconstitution, and for crew hygiene and washing functions. That the restraints do provide effective immobilization, or location, is illustrated by the fact that he can reach down and open a locker. The items in the left hand side of the locker, are magnetic tapes for the Earth Resources tape recorder. On the right hand side, are spare sleep restraints for the SL-III and IV crews.

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With a quick twist of the ankle, he releases the triangle shoes, and translates down to the food storage lockers on one side of the workshop. The Skylab food, is of several types. There is freeze-dried, reconstitutable food, there is thermal stabilized, or canned food, like you'd get canned peaches in the store. And then there is frozen food. The three white lockers at the top of your screen are frozen food stowage lockers for the Skylab III and IV missions. Following the duration of Pete's pointing, we will in a minute look over at the scientific airlock that points away from the sun. Right now, underneath his hand, that is over his right shoulder on the floor, is a French experiment. The S183 ultraviolet stellar panarama, which photographs the stars in the ultraviolet region of the spectrum, mapping and hoping to discover new star fields and new information in this vitally important region of the spectrum. Installed in the scientific airlock, just out of view, in the left-hand corner of your screen, is the S073 photometer experiment, which is looking at the scattered light from particles that have accumulated around the spacecraft, and are forming a small contamination cloud. We're vitally interested, here it comes into view in the upper left-hand corner of your screen now, Pete's translating over to it. We're vitally interested in the dynamics of such clouds and such contamination, since these effect the observations that are possible with the Apollo Telescope Mount instruments and with future sensors. Pete has grabbed hold of and has backed up against the white covered fire hose, that would be the primary defense in the workshop in the event that we should have a fire, is charged with water, pressurized from one of the water storage tanks and has a nozzle which you see floating freely on the left hand side of your screen. One of the amazing things about Skylab has been the demonstration of the - -

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SPEAKER There's a nozzle which you see floating freely on the left hand side of your screen. One of the amazing things about Skylab is has been the demonstration of the facility in which the crewmen can maneuver and the lack of adverse affects such as dizziness or motion sickness, coupled with the acrobatic maneuvers. Here you're looking at a stowage locker; locker 702, which was shown to us this morning as a part of a TV documentary, mainly for the benefit of follow-on flight crews and for ground controllers. This locker contains shower supplies such as soap, towels, and things of the like, and was relocated from it's position in the wardroom to it's position here just above the tool kits, but conveniently adjacent to the shower. The crew is engaged in a fair amount of dymamic rearranging of the furniture much as any new householder would given his first few days in a new home. Another locker was relocated here in the wardroom, 749. And they will show us about this view and relocation of the food storage tray to be more convenient to the dining area in the wardroom. The device across the front of the locker is a spring bungee. It's nothing more than a coil spring with a snap on each end that can be used for temporarily holding things in position behind it since of course, we have no gravity. And you can't put something down and expect to come back and find it there. The trays at the top of your screen are pull-out beverage trays. They contain spring loaded storage clips for restraining the reconstitutable beverages that are consumed by the Skylab crewmen. In the center of your screen you see Joe Kerwin's foot sticking down, on the bottom of the foot is little device called a mushroom. It's really a sort of a hook that can fit through the triangular gridwork and catch in the corners allowing him to pull himself down into position and hold himself located very stably. What you see here is one of the three pressure suits. Of course, they're not in use right now, but in zero gravity, that is being weightless, and with just a little bit of air pressure trapped inside them they take on the form of a full fledged man. The location for stowage that we agreed upon preflight, that is in the spare docking port, didn't work out very well because of the unexpectedly large bulk of these suits. So the crewmen have restowed them. One underneath the ATM foot restraint; one over there by the docking probe, and the third one up here on top of one of the film stowage lockers in the multiple docking adaptor. They're showing us these views so that we may revise our checklist, change our crew training procedures, and have the Skylab III crew, which launches on the 27th of July,

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go up fully prepared and ready to take advantage of the zero-g conditions that prevail up here in our unique orbiting workshop. We're now standing back down by the video tape recorder that I mentioned previously and we jump once more down into the experiment compartment. You're looking from the experiment compartment in the bottom of the workshop into the commander's sleeping compartment, or sleep stateroom. It's a very small compartment, not at so to speak, vertically. Of course, in zero-g there's no up, there is no down, so the commander sleeps more or less in a sleeping bag strapped up against the wall. The only opening to the sleeping bag is around the neck, but that doesn't cause any problem since to get out of the sleeping you merely slide out from the neck and float over to the doorway as he's doing here now. The sleeping location is at personal option. The commander's been sleeping down here as has been the science pilot, Commander Kerwin, and the pilot, Commander Paul Weitz, has been alternating sleeping down here with sleeping in various other locations to evaluate their habitability. Captain Conrad is now going to demonstrate our trash disposal system. It's not really as modern or exotic as you might think. This large brown container takes trash that's bagged in a white disposal bag. It's put inside, the lid is closed with an able assist from the science pilot - -

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McCANDLESS - - trash that's bagged in a white disposal bag, is put inside the lid is closed with an able assist from the Science Pilot. And then the system is vented from the 5 PSI atmosphere in the workshop to vaccum. You'll notice Pete watching the pressure bleed down on the pressure gauge in the center of the lid. We have another tank formerly used as a liquid oxygen storage tank, when the Saturn IVB was a lunar, a lunar mission booster. This tank has been converted into a trash holding area at vacuum and the contaminated waste, that is those wastes which have food residue and things of this sort of them, and might be biologically active, are bagged, vented into vaccum then by means of this device, which is a trash airlock, are dumped down into that holding tank and left there for the duration of the mission. Nothing is dumped overboard on the Skylab mission. Everything that goes up with the, exception of gaseous leakage, is held down here in the oxygen tank or onboard. After reclosing the outer door by the handle which he just operated, Pete will open the lid and show you just like the proverbial magician, that the container is now indeed empty. The green device that you saw in the lid of the trash airlock was a bell crank operated plunger that serves to force the trash through the open outer door. This is a pair of the triangle shoes, to which I have been eluding during the course of this TV presentation. The toes have become scuffed up in the course of navigating around the workshop. Since the crewmen have not only used the triangles for estraint, but also been hooking their toes underneath objects or in through the grid work. A simple 30 degree twist serves to unlock the triangle from the grid work and it is then free, or your foot is then free to move about without any encumbrance. On return the triangle is pressed down through the gridwork, rotated to lock it in place. These devices as well as the mushrooms, which serve a similar purpose although they don't lock you in place, have been very useful in aiding the crewmen in holding position although they've also shown an amazing ability to float around and grab hold of whatever presents itself as a convenient handhold. Joe Kerwin has just come over and, - excuse me I think that's Pete Conrad has just come over and grabbed hold of the handles of the bicycle and is now in the process of locking his triangle shoes into the bicycle pedals. By doing this, he cannot only push down on the pedals, but can also pull up on the opposite pedal, which helps to hold himself in position on the seat of the bicycle. Of course, in zero gravity, the seat isn't really required, but it does help to keep him in the right general location. Original preflight concept was of a harness consisting of shoulder straps and a waist belt that held you firmly down against the seat. On

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the initial runs, however, the crew reported that t... harness tended to cut-off circulation at the waist and was . the most appropriate device for restraint. They preferred to hang on the the handlebars and just equalize the forces exerted pulling up and pushing down by their feet on the pedals, as Captain Conrad has demonstrated here. You can see here the amazing mobility. The Russian dancer technique, that is available to a crewmen restrained only by the ball of one foot, in that amazing world where there is no up and there is no down and there is no gravity.

McCANDLESS The round device you see in the upper right hand corner, is the crew shower. It's just a circular shower curtain which can be drawn up around the outside of you and water sprayed in. This is, I believe, the subject of a separate television documentary, so I won't go into it any further here. Pete's demonstrating how you finish filling and then close the lid, seal the lid of a trash bag in preparation for installing it in the trash airlock. And ulti - -

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McCANDLESS - - and enclose the lid - seal the lid of a trash bag in preparation for installing it in the trash airlock and ultimately dumping it down into the former liquid oxygen holding tank beneath the workshop. It just goes to show you that even in space somebody has to take out the garbage from time to time. You can see again the green plunger in the lid of the trash airlock. This plunger is on a scissors type of extention mechanism, and upon operating the handle on the far side of the airlock the plunger's extended thereby forcing the trash down through the outer door of the airlock. The lid is closed in this case with an able assist from the Science Pilot, Commander Joe Kerwin. The container is vented to vaccum and Pete's in the process of opening the outer door.

SPEAKER Okay, that's it.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 17, 1973
4:23 a.m. CDT

PARTICIPANTS:

Neil Hutchinson, Flight Director
Joe Jones, PAO

SL-II PC-58A/1
Time: 04:23 CDT
6/17/73

PAO All right, we'll start the change of shift briefing now, with Flight Director Neil Hutchinson present. Do you have a statement, Neil?

HUTCHINSON Yeah, it is going to be real short. We had a quiet night last night. We worked a couple of little problems, nothing real serious. We've been trying to get everything all set up for this EVA, in terms of the systems configuration. Last night, we worked on a procedure for a - as you recall yesterday during the day, they dumped a condensate tank, the big holding tank that is used for keeping water, holding water that's been removed out of the atmosphere inside the workshop. And we've discovered we've got a couple of leaky quick disconnects in that system. And that system has to be used to remove water when there is an EVA going on. And of course, we had a procedure we thought could work the disconnects, and it turns out it is not going to - so because apparently they're all leaking, both of them. The one up at the panel in the airlock and the one downstairs. So we worked on a procedure last night to square that away, and I think it's straightened out. We didn't have any systems problems last night. We've pretty much blocked out the EVA plans for day 26, and I have a preliminary flight plan here. And the hatch - well, I can't give you hatch open yet, but the preliminary times we've got to actually begin the EVA which would be somewhere near hatch open or in the area of 12:30 Zulu on mission day 26, day of the year 170. So, that's a preliminary time on that. And the day is pretty well blocked out, do an EVA - we have some spare time there. Let me see what else we have here. Yes, yesterday we finished M552, and that finishes our use of the 512 facility. Our old friend M509, the astronaut maneuvering unit, is back in the picture again. The flight management team has decided that we are going to run the M509 on Skylab III and IV. And of course, as you know one of the questions has been, what's the status of the batteries on the 509. Basically what we're going to do on the 509 in Skylab II is today the CDR is going to top, he's going to fill the bottles on M509. And tomorrow we will run a 509 checkout run with the, not the thing on, but in the stand, in the test stand, in the stand, it's stowage stand there will be firing jets and so on and so forth. And we will use external power, we'll use workshop power instead of battery power, because of course the concern is that the batteries that we have onboard aren't any good because of the heat stress that they have seen back when the workshop got rather hot. So basic plan is to check out 509 to

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make sure it is working, and then fly it on Skylab III and IV. And we'll obviously have to work the battery situation later. That's about all I have on systems. And as far as the flight plan goes that we've built for day 169, it is full up again. Day 169, mission day 25 is the last day for ATM operations. We're slowly but surely closing this baby down. And we have got a full day of ATM operations. We also have 2 medical runs on M092 171. And the end of the day, we close out day 169 with an hour and a half worth of prep for EVA where they are going to get the suits out and get the hoses all laid out and so on and so forth. That's all I have.

PAO Okay, Tom, question?

QUERY Neil, what time is that check out on the 509 tomorrow, do you know?

HUTCHINSON Oh, we haven't scheduled the check out yet. I beg your pardon, we have scheduled it. And yes, I can tell you exactly when it is. It begins at 14:30 Zulu. And the PLT will do it. And it's about a 30 minute operation. And he's not going to put this thing on now and maneuver around with it, the check out is done completely in the test stand, in the support brackets there where it's stoved there in the workshop.

QUERY Now, is that tomorrow or today?

HUTCHINSON Tomorrow, day 25.

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HUTCHINSON - day 25. Today, the only M509 activity is the CDR will charge the - one bottle. I believe the CDR's going to do it - with nitrogen - charge one bottle of nitrogen.

QUERY PAO only said a little bit about the TRIM burn, that is to put it back in it's original orbit. Could you say something else about that?

QUERY And it was successful, right?

HUTCHINSON Yes, we did do the TRIM burn just before I left this morning, it was on-time nominal burn, everything looked exactly right to us. The purpose of the TRIM burn is to have the orbit back on nominal by Skylab 3. It takes that long for it to propagate back to nominal. And basically, what that meant was shifting the line of nodes so it would be in the proper place so you would be crossing over the proper point in the ground and also establishing the repeating feature, which is the same thing we did at the beginning of Skylab 2. Those are the two basic criteria. Get the ground tracker with the right place in the ground and get it - get the orbit shaped such that it repeats every five days. And I am not sure the exact time that that - we achieve that. I assume that it is prior to the first EREP pass - first planned EREP pass of Skylab 3, so I imagine it's toward the end of July.

QUERY One more, there seemed to be some questions this morning about ATM instructions. Do you know what the problem there was? The team seemed to be confused.

HUTCHINSON Yeah, it wasn't really a problem. It turns out that we had sent a couple of different messages on the ATM - or comments on ATM operations in different messages, and one of them concerning when to stop using S082A and B was just a tad ambiguous. And what he was basically concerned about - the question he had, and it was a valid one - and we still have to - and we didn't answer it adequately, was when should he stop using 82A and B film for a flare. And of course if you initiate a flare mode in 82 A and B it takes an automatic sequence of X number of films, and we have a requirement to save some film right at the very end of the roll in the two cameras for calibration purposes. And, his comment was that we sent him a message and told him where the calibration film started but we didn't tell him where to shut off the cam - where not to - whether to disable the automatic flare mode in 82A and B. In other words, if he gets a flare, go after it but don't use 82A and B. And that's correct, we didn't tell him - we had to pass him that data - it was nothing more than a little ambiguity - ambiguousness in the pads we sent up. Nothing wrong with the instruments. We're just having a hard time communicating with one another.

PAO We have one question phoned in by CBS. Will there be television for the EVA?

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HUTCHINSON Yes, and I don't know whether it will be live cause I'm - well let's look at the ground coverage. Yes, and they will probably be at least, in fact, there will be at least one and maybe two live passes. However, the television will not be taken outside the vehicle. I believe they're going to operate it as they did during the other EVA from inside the airlock, either through the STS windows or through the CSM windows. And we are going to be running the video tape recorder for a good part of the EVA, so it will be on film also.

PAO Anything further, Tom? Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 16, 1973
15:04 p.m. CDT

PARTICIPANTS:

Charles Lewis, Flight Director
Don Green, Public Affairs Officer

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Time: 15:04 CDT
6/16/73

PAO Good afternoon, Gentlemen and Lady. On my right is Charles Lewis, off-going Flight Director, prepared to give you some information on the shift that has just ended. Charles.

LEWIS Okay. Today we had scheduled the entry simulation and that was completed early. No problems, basically just a chance for the crew and the ground to go through their checklists and procedures, timeline activities and a chance for the crew to make any comments or work out any wrinkles we might have. Appears to be no problem there. They did finish a little bit early, so we worked in some additional housekeeping functions. And this afternoon late, of course, they had M092 171 runs and picked up a couple of ATM passes during their presleep activity. Tomorrow is basically another experiment day. ATM operations, M092, 171, M131 and some corollary work. And we have a trim burn scheduled for tomorrow at 08, 8 hours 59 minutes 27 seconds GMT. It's a very small burn about 0.3 feet per second, about a 9 second RCS burn and that's of course to set our ground track up for SL-III. And the crew, as one of the housekeeping functions they picked up today since we had some free time, was supposed to complete part 2 of the OWS TV tour. So that should be dumped later this evening or early in the morning. That's about it, unless you have questions.

PAO Okay, stand by for the man with the long stick. He should be in momentarily, I'm advised.

QUERY Have you got an EVA timeline?

LEWIS No, I don't, and I don't think we've got an exact EVA time yet.

QUERY You wouldn't have a hatch open?

LEWIS No, that's what I'm saying, it's day 26, I don't think we have a hatch open time yet.

QUERY Okay, very good. Thank you. That's all.

QUERY How far did they get today in the entry sim, when did they stop?

LEWIS As I recall, we stopped about an hour an a half to 2 hours before we normally would have stopped. And at that point we'd gotten about as much out of it as we could, we thought and we just asked the crew if they'd gotten what they thought they needed. And they said yes, so we terminated.

QUERY You stopped before the deorbit burns?

LEWIS Uh, yes, I know we went through separation and I think we simulated separation and the first burn, I'm sure I don't know just exactly how far we got. Another Flight Director was on duty and conducting that operation.

QUERY Just before we, you came over here, there was some talk about the condensate tank. Could you run down and

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give us an idea what the problem is there, what troubles they're having with it?

LEWIS Well, basically I think the problems is that some of the quick disconnects, if they have a vacuum in the line of the tank, you disconnect, the quick disconnect coupler it's not holding, it's pulling gas, cabin gas, into the system, and they lose their pressure differential. But, there's basically three tanks in the system, the small holding tank, in the airlock module, holds about 16 pounds of water. That's connected to what we call a holding tank in the OWS. That holds about 660 pounds of water. And then what we were doing today is dumping that holding tank down into the large waste compartment. And apparently when he demated the hose, to make the connection for the dump, we got some gas leakage.

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LEWIS What we were doing today was dumping that holding tank down into the large waste compartment, and apparently when he demated the hose to make the connection for the dump, we got some gas leakage back into the system and he lost his DELTA-P. There should be no problem in the system. We had the same thing happen on the EVA. I don't think it's a real problem. We'll be able to establish the system integrity, and it'll function properly.

QUERY The trim burn tomorrow - what does that do to the ground track for SL-III? It moves it west 60 miles - is that?

LEWIS Well, what we're trying to do is - this burn is designed to put us back on a nominal ground track for SL-III. Now I think in SL-III we normally planned to do a trim burn about the 4th day into the mission, and so we're trying to get back to that point - 4 days into SL-III. And then the - we vary off the nominal ground track over a period of time - it's sort of cyclic. We burn - we do a burn which takes us, I believe, east of the ground track for a period of time, but then it slowly drifts back across the nominal ground track west. And we do another burn, and we just cycle it - we do that because of the atmospheric drag. But basically it puts us back to a nominal ground tracker position on day 4 of SL-III. And I don't - We try to keep that cyclic motion within about 55 degrees - 55 nautical miles of the ground track for the EREP instruments. But we cycle within that, no problem.

QUERY Looking on the 7-day forecast, I notice that a few days before undocking and deorbiting, they would start deactivating the workshop. What does that involve?

LEWIS Well, they power down equipment that will not be required, since it's not going to be manned - fans, duct fans, various items we've got on now to support living conditions in the OWS. Those are the basic things.

QUERY I have two questions. You mentioned with their housekeeping time today they had time to finish their tour of the OWS. What did the term housekeeping cover?

LEWIS It covers many, many things. Changing filters out and - various lines. The condensate or the holding tank dump into the waste tank is one I mentioned. There's just many, many little systems housekeeping works. It's just keeping house, basically. Now TV is normally not housekeeping. I may have mislead you. But they had some spare time, and we gave them some housekeeping functions plus we gave them the choice of - we ask them to do the TV tour - or TV5 - I don't recall what TV5 is. It's in the TV OPS book. And they said they'd do the second half of the OWS TV tour.

QUERY The other part of that question is how much housekeeping are they going to have to do to get ready to leave, in conjunction with this deactivation?

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LEWIS We normally schedule anywhere from - as I recall, anywhere from an hour and a half to two and a half hours each day for housekeeping. And those are various chores. A lot of them are systems related. Like I said - clean up, filter changes - I don't think that we would schedule any more than that on deactivation day, because we scheduled deactivation to take care of everything else. So there will be no additional - I don't believe additional housekeeping time per se. If it is housekeeping, it would be scheduled and required at that point in time to be scheduled as part of the deactivation. And I don't know how to separate that for you; I don't think I could.

QUERY Are they going to have to strap down some things - and go around and kind of clean out the corners?

LEWIS They stow things away, clean it up for the next crew. When I say stow, that means in various compartments, and, of course, they're fixed. They're tied down. And they're working on some of the stowage now, as a matter of fact. They have over the last two or three days. When they get some spare time, they go through various stowage procedures.

QUERY Has the decision been made yet on the EVA? Will they go out and tap the battery case on 15 and see if the relay is stuck?

LEWIS I believe they will try that. I believe that's in the plan.

END OF TAPE

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QUERY On the EVA, will he go out and tap the battery case on 15 and see if the relay is stuck?

LEWIS I believe they'll try that. I believe that's in the plan. That's CBRM15.

PAO All right, thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

TV TOUR - CREW QUARTERS
Johnson Space Center
June 16, 1973
12:37 p.m. CDT

Participant:

Rusty Schweickart

SL-II PC-56A/1
Time: 12:37 CDT
6/16/73

PAO All right, we have with us, today, astronaut Rusty Schweickart. And he will narrate a playback of the TV tape showing a tour of the crew quarters in Skylab. We did not get a sound track on this tape as it was dumped this morning. Rusty.

SCHWEICKART Okay, here we see Joe Karwin in the orbital workshop. We're down on what we call the crew quarters deck. This is the location where we have the sleeping compartments and the - many of the medical experiments. Joe here is introducing the viewer to the area that we call the experiment compartment. Behind Joe you see the circuit breakers which distribute the electrical power to the various experiments and electrical equipment used down here in the - on the crew quarters deck. Joe is pointing here to the refrigeration system displays which indicate the temperature of the various chillers and freezers that freeze the food and urine. The temperature control system, the so-called thermostat, what is the equivalent of a thermostat in a house. He's now going past the circuit breaker panels to indicate with his right hand there on a - what we call speaker intercom assembly, the speaker box, which the crew normally uses to converse with mission control here in Houston. You notice that Joe now has in his hand a long cord and a microphone around his neck that he's using. This is just for the TV tour, normally we press the various switches and controls directly on the speaker box. In front of Joe now, is the M131 rotating chair. This chair is used in 3 different modes. One to investigate the sensitivity of the inner ear to motion disturbance. A second is to determine the sensitivity to angular acceleration and how that sensitivity changes with time in zero gravity. Again, this is an inner ear function. And the third mode is to try and determine whether there are any changes in the astronauts sense of up and down, or his - what we call spatial localization overtime. Joe is now arm waving here into the sleep compartment. We have three seperate compartments for the crew. Each of the compartments contains a sleeping bag, which Joe is pointing to now. It's rather dark in there and you're not able to see it very well, but the sleeping bag is suspended vertically in this picture. However since there is really no up or down in space, and in a moment here you'll see Joe just floating free, to sleep upright really has no meaning.

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QUERY What is he doiug there?

SCHWEICKART You see here now, he's demonstrating, I think, getting into the sleeping bag, but since I don't have any idea what he's saying either, you have to sort of take my word for it. Outside the sleep compartment, he's pointing here to one of our fire detectors. It's a small electronic box which has a lens on the front and monitors for ultra violet light and if it sees ultra violet light, which might be generated by a fire in the spacecraft, it trips an alarm and in a moment I think, you'll see Joe make that sort of panic move signaling what happens if the fire alarm goes off. And this has happened a couple of times on the flight, all of them false alarms, one during the EVA when direct sunlight hit one of the fire sensors in the EVA lock compartment while the hatch was open. Again, I wish I knew what he was saying as well as you do. Joe's now moving from the sleep compartment to the bathroom of the laboratory and now he just chased a glob of water and you can see on your television screen that a bit of the water ended up on the lens of the TV camera. He's pointing back to the toilet or the potty chair that you can see sticking out of the wall there. If I remember right, now - -

END OF TAPE

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SCHWEICKART He's pointing back to the toilet or the potty chair that you can see sticking out of the wall there. If I remember right now, he moves into the compartment, and he's going to pull a tissue out of a tissue dispenser. Okay, here he comes, and now he's going to wipe our eye for us. And you notice now we've removed the spot of water. You can notice that the effect of zero gravity is that everything floats, including the communications cable which he's using to talk. And occasionally that gets cumbersome and in the way. Joe now his hand on the trash airlock. This is the so-called trash can of the spacecraft. Rather than keep the trash, some of which is - has organic material in it, in the living environment with us, we have an airlock into which we deposit our trash. And Joe's opening up the top there. Unfortunately, the tape was spliced at that point. He has in his left hand a bag into which we place trash. That bag goes into the trash airlock and is deposited down below the floor you see here, into what was formally the liquid oxygen tank of the S-IVB booster. And this is kept in a vacuum down there and becomes a sort of trash dumping area. So every night the crew goes through this disposal of waste material down into the trash dump. Now Joe has moved now into the wardroom. He has his left hand there on one of the food trays and is indicating the heating wells into which he's going to place one of the large food cans. He pulled off a piece of protective cardboard there, and he placed it in the heating well. And over on the other side of the food tray, he's simulated setting the timer, which would automatically turn on a heating coil to prepare the food for eating. And this timer can be set in such a way that when it's time for the crew to eat, the timer has come on and heated the food, and it's just the right temperature. Now he's throwing away that piece of cardboard into a trash disposal locker. You see, we have a flapper door on the front of it and then a rubber diaphragm, which keeps all the trash in but still lets you push trash that you have in your hand through it. There is also a cover that goes on the food tray, and perhaps you've seen that on some of the other TV that's come down. Once we load up the food tray with the next meal and set the timer, we put the cover on, so that we don't try and heat up the air as well as the food. He's now indicating, on the wardroom table there, the two water dispensers. We have water dispensers we use to reconstitute the food, one of which is - puts out hot water, and the other puts out cold water. He's looking for a - one of his own drinks for this day. This is yesterday evening. And he's taking the top off of it, and in just a moment you'll see him put it over the cold water dispenser and fill it up and take a drink from it. Now he has dialed in the amount of water which should go into that bag. I don't know whether it's orange juice or

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grape drink or coffee. But core to think of it, since he's on the hot water dispenser over there, it's probably either cocoa or coffee, or perhaps tea. And he has injected water into it, and he shook it up. And now you notice it accordian out, and he now squeezes it into his mouth.

QUERY Did he bite off the original cover (garble)?

SCHWEICKART Yes, probably. He's now pointing to the wardroom window. This window has a cover over it which is slid over it now in order to keep from blinding the television camera. The Earth is so bright when you look at it, that if that window cover were off, unfortunately we would not be able to have a very good view in the wardroom because of the brightness of the scene outside. So the window itself is actually covered here. But, as you can see, it's quite large, and the crew has enjoyed very much looking out of it. Now he's indicating some of the storage lockers, and spread across the front of several of them, you can see some spring bungees, which we use to store books and papers under. Joe's now moving over to the other side of the wardroom, and the cable which you see in his hand comes from an electrical outlet on the floor above and comes down through the ceiling and is plugged into - And there's our friend, Pete Conrad, in the picture. That cable is plugged into the inflight medical support system, in which we have a - some medical equipment. And one of the items of equipment in that kit is an incubator for incubating cultures. In case someone get sick, we can swab the throat very much the same way that your doctor would do it and incubate the culture to see what the problem is. In this particular case, the incubator is hooked up because their - the crew activated a student experiment - a high school experiment yesterday called ED31, in which they are growing cultures for this high school student. And in just a moment - -

END OF TAPE

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SCHWEICKART ...a high school student experiment yesterday called ED31, in which they are growing cultures for this high school student. And in just a moment Joe will point out to you the cultures which are presently being grown and photographed. There they are, he has six of them. They're in transparent culture dishes and we periodically photograph these to see how the cultures are growing. You're now looking out again into the experiment compartment. I think Joe is going to come back in to show the entertainment center. He's just opened the door to the entertainment center and on the inside of the door you can see a stereo tape recorder which is suspended there and on occasion we at the Mission Control Center are entertained by music wafting down through the airways. Some of it classical, some country, we have something for everyone. Also in the entertainment center there is a library. The crew took up quite a few books, and of course, we have not only the books for the Skylab II crew, but also for the Skylab III and IV crews which will be going up on 56 day missions later in the year. Joe has moved back out into the experiment compartment and this is the compartment which contains most of the medical experiments. We've already mentioned the rotating chair. Joe presently has his left hand there on the seat of the bicycle ergometer. Pete Conrad has just shut out a light - turned out one of the lights so that we get a better quality picture. The bicycle ergometer has - is used to measure the ability of the astronaut crew to do work over long periods of time in zero gravity. They ride the bicycle and were able to measure not only the work that they put out but also the carbon dioxide they produce and the oxygen that is consumed as well as electrocardiogram, blood pressure and things of that kind. This information is compared with the same type of information on the same equipment which was gathered pre-flight in the control period when we knew what the condition - the physical condition of the crew is. Joe is presently getting into the shower and this is sort of a - a cylindrical hoop skirt that is compressed against the floor and he'll demonstrate here in just a moment that you get inside it and then pull it up around you. And he doesn't get it all the way up because he's got the cord going to the speaker box at the moment but you'll see that he brings it up there around shoulder height. And you can see that would go right up to the ceiling and latch into the ceiling, in which case you just erected yourself a stall shower. I think that's the end of the tape that was transmitted last night for the

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E - for the tour of the crew compartment.

SPEAKER Thank you.

SCHWEICKART Okay, and I'll be glad to answer any further questions if people have them.

SPEAKER No questions?

QUERY This doesn't bare directly on the TV show, but we talked before about zero gravity and about how much easier it is to work. Do you have a feeling - of course this won't be answered until after Skylab IV and even longer missions - do you have a feel yet as to whether you personally would perfer to work in zero gravity for real long durations, say 6 months or a year? Or would you rather have some artifically induced gravity like induced by spin or acceleration?

SCHWEICKART Well, this is one of things which we certainly hope to answer on flights of this kind. There are really several different aspects to it. One is what we as human beings individually would like to have on a purely subjective basis, and of course, the other is, what environment is suitable for certain operations in space. There are quite obviously some things which you'd like to do which need from the technical point of view, which need gravity, so that we may have to provide an artificial gravity environment even in what is basically a zero gravity spacecraft. From the purely personal point of view, and not only from the personal point of view, but speaking from my own point of view, and I really can't speak for Pete and the guys that are up there now over long duration. But my own personal experience was that zero gravity was a very, very plesant and enjoyable environment in which to work. It - it's not all peaches and cream, however. You pay for it in certain undesirable aspects again at the personal level. Handling fluids to drink is not a simple matter when - when you have zero gravity because of course, it just floats out of any container, and you therefore have to have a closed drinking containers as you saw there. And any gas that's trapped in the container when you fill it with water, or mix it with water, you end up having to swallow it, so that you do end up with kind of a general bloated feeling. But I have a feeling that - -

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SCHWEICKART -- or mix it with water, you end up having to swallow. So that you do end up with a kind of general bloated feeling. But I have a feeling that over a long period of time, that's something that you probably get used to, become accustomed to, and it no longer bothers you. Over a short period of time, of course, is something you have to adapt to. But, in general, floating in a zero-gravity environment is very pleasant, and the TV that we've had come down from the Skylab makes that very obvious. And I think - My guess is that the crew is going to come down and say that, at least from the human point of view, it's really a fun environment to work in. Now as I say, there are - If you look at the problem of a rotating space station, which of course you have to have in order to provide an artificial gravity, then there are several inherent disadvantages. Anytime you want to look at the Earth to do Earth resources experiments or even point communications antennas or things of that kind, or if you want to look at the Sun or look at the stars or any external looking device - And of course this is one of the opportunities that is opened by space travel, by getting above the atmosphere. Then if you're doing it from a rotating device, you have to - you have a large pointing problem, because you have to counter rotate your antenna or your telescope or whatever it is you're using. So for anything which looks out from the spacecraft, a non-rotating or a zero-gravity space station is obviously desirable or less complex, let's say. On the other hand, as I say, there are certain things, certain types of experiments, which we'll want to do in space where you probably will want to have a controlled and perhaps even variable gravity environment. So I think we're going to probably find a mix in the future.

QUERY What did you find was the biggest disadvantage of zero-g when you were out there, as far as, you know, personal fooling around or whatever?

SCHWEICKART Well, I think - Again, there's just no way that I can speak for Skylab. But certainly on the early Apollo missions, one of which I flew on, Apollo 9, we had a considerable amount of gas trapped in the water supply. So that when we filled up a drink bag to mix orange juice or cocoa or anything of that kind, we quite often ended up with 40 percent of the volume of that bag filled with gas, either oxygen or hydrogen or mixtures of gases, which, when you swallow them in order to finish off your drink, you have no choice but to swallow the gas along with the liquid, and as I say, that became a little bit distasteful. Now since that time, that situation has improved, and on Skylab, from everything we've been able to see, the drink bags, for example the one Joe filled there, appears to have a very small portion of gas trapped in it, which then makes it much less distasteful. I would say that that was the most, let's say negative aspect of, that I found in zero gravity.

QUERY I kind of hate to bring this up because it might be a little distasteful to you, but you did have a problem with illness on Apollo 9?

SCHWEICKART Yes.

QUERY And I'm not clear at this point whether that was a product of the gas in the drinking fluids or whether that was motion sickness or a combination or whatever. Could you refresh my memory and also comment upon the fact that M131 has apparently not induced any motion sickness at all in zero-g, even though it came pretty close on the ground?

SCHWEICKART Yeah, I really - Well, let me take the first one. I have a hard time commenting on the second one. I don't think I'd like to draw any conclusions without really taking a look at the data on that. But let me go back to the first part of your question. In my case on Apollo 9, I did get sick on two occasions on the 3rd day of the flight. There is some small probability that that was due to the trapped gases or something in the food. But the probability of that, at least in my mind, is very low. The much more reasonable answer to that was motion sickness, which in this case may be a misnomer, because it's - -

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SCHWEICKART - - due to that was motion sickness, which in this case may be a misnomer because it's sort of non-motion sickness. But it's basically a change in the environment which affects the functioning of the inner ear. And of course one of the very basic reasons why M131 is flying is to try and investigate what that sensitivity is and how it changes in going from a 1 gravity environment to 0 gravity and back into 1 gravity again. There are rather large individual differences, which we've seen, which no one really understands why or how they correlate with different individuals. It's really - in a sense, a wide open subject which we're gathering data on, but really don't have any decent models to be able to predict what any individual reaction will be, or what happens over time. Now in my own case from the subjective point-of-view, once that initial bout of motion sickness was over with, it was very obvious that I accommodated rapidly from that point on. And it would not surprise me at all to see that the results we're seeing on M131 today in Skylab, reflect very much that same thing. That is that there was, in the case of this crew, a more rapid accommodation to that environment than was the case for me. And that not only was it rapid, but that it - it's gotten to the point now where we've almost doubled the speed of rotation of that chair, and still to my knowledge have seen no symptoms whatever of motion sickness. And, again, that's somewhat my own experience, except that I apparently, for whatever individual reasons, started from a lower accommodation level than the crew that's up there now did. But this is something which is very basic to spaceflight, and one of the primary reasons that M131 is on board, to study exactly this phenomena, and try and understand what it is and how it changes with time.

PAO Okay. Thank you a whole lot.

SCHWEICKART Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 16, 1973
4:36 a.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
Milt Reim, PAO

SL-II PC-55A-1
Time: 04:36 CDT
6/16/73

PAO We'll get started here with the early, early morning change of shift briefing. Neil Hutchinson, the Flight Director, will give us a brief summary of what's taking place and what is to take place.

HUTCHINSON Okay, let me tell you a little bit about tomorrows- sure we're going here, Milt?

PAO Rog.

HUTCHINSON Okay, tell you a little bit about to-morrow's flight plan. Day 168, mission day 24, Sunday is absolutely packed with experimenting. It's the biggest bunch of ATM time that we've been able to pull together since I've been doing these summary shifts. We have almost 6 hours of ATM manned viewing time. Of course the ATM time has been going up since we aren't doing the EREPs any-more. The SAL, the plan for the use of the minus-Z SAL that I gave you yesterday is being followed exactly. On day 167, that's today, the day we're flying now, we're going to finish S073 operations. First thing in the morning on - as soon as we get up on day 168, we'll be taking S073 out of the SAL, and we'll put S019 in it and we'll get two S019 runs on day 168 and then we're going to take S019 out and put T027 in. And T027, the sample array will remain in the SAL for about 3 days. Got two med runs. The last two M131 runs, the ones being done at 30 RPMs, are being done on day 168. That'll be the end of the M131 experiment for Skylab 2. We're doing our last calibrations of the mass measuring devices, we didn't get the body mass measuring device cal in the flight plan, but we did do the final calibration on a speciman mass measuring device, the little one. And that's kind of a synopsis of the flight plan on day 168. Oh, one thing I ought to comment on, the trim burn. The trim burn is being done on the morning of day 168. Right now, and we're still trying to home in on a number, the burn is going to be only .4 of a foot per second, and the current time is at 08:55 Zulu on day 168. The plans for using - let me talk a little bit about systems and experiments now. We have a plan put together for how we're going to - of course you know that we're only doing a single EVA now. Or the EVA for a single purpose, or a single EVA, to get the film. CBRM 15, whether we're going to do anything with that is still being talked about, however it's beginning to look more favorable that we indeed will try something with CBRM 15. We do not as of yet have the final plan for how we're going to operate the coolant loop and the SUS loops but, we have our preliminary procedure put together, which basically calls for us to attempt to free the TCVB valve in the secondary loop, and run the EVA with a standard loop configuration, with one EV crewman on the prime loop, one EV crewman on the second loop and the IVA crewman on the second loop. And that's pretty much where that stands. The two coolant loops are performing about like they been. No changes. The one thing we did get fixed and the crew did it on their own, they keep one step ahead of us. In the day 168 flight plan, the one we built last night, we scheduled an hour to change out the dispenser in the waste management compartment - the water dispenser, above where the wash cloth squeezer is, because we think that that's where the flow problems are coming from in the water system. You know, they've been talking about that for a week. And lo and behold, when we got the channel B tapes dumped this morning from last night before they went to bed, there was a note on Channel B. They've already changed it out, and the valve was indeed all gobbered up inside, and it did fix the flow problem, and that was the only spare of that thing we have on board, so we'll probably be talking about taking another one up on Skylab 3. So the water flow problem that we had in the waste management compartments is finished. That's it.

PAO Okay, we'll start - go ahead Art, then we'll work on down.

QUERY Okay, I guess a couple of things I'm curious about. If you could explain maybe, what you're going to do with the time that you're getting back from only having to do a single purpose EVA, and also, I'd like you to go into the philosophy of why you're doing an entry simulation today? What was the thinking behind it that makes you do these kind of things?

HUTCHINSON Okay. First things first. As far as the time that we picked up, which looks like about 6 hours. Six man hours. We haven't definitely planned anything for it yet. I suspect what it will end up doing is getting, of course, you know, it won't be used for ATM, because the ATM is closed out. We'll be running it unattended from then on. The ATM is closed out immediately after the EVA, and it's not operated again, manned. I suspect right now, if I had to guess, I would suspect that we would probably do some corollary work, and I really don't know what. I also think that there are several items that we have been putting off as we've marched on down the line here, that will chew up quite a bit of it. Let me tell you the kinds of things they are. They're all very unglamorous. They're - We've got about 2-1/2 hours worth of EREP closeout to do. Cleaning the tape recorders, reloading mags, transfering tapes, accounting for the swabs, like just a whole merit list of busy work that needs to be done to finish off the EREP thing. We have a couple of big systems things that we've been putting off. One of them is dumping the big con -

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HUTCHINSON We have a couple of big systems things that we've been putting off. One of them is dumping the big condensate tank. That's an end of mission systems thing that takes about 3 hours. And if all planned, it was a nominal planned thing. We just gotta work it in somewhere, and it's already been proposed to be stuck in that time. We have been putting off the big BMMD CAL. We tried to get it in again last night and couldn't. And we'll probably try to get it in at day 169, and I'm not sure we'll get it in there, if that might slip over. So what I'm telling you is that I think that we're just darned glad to have the 6 hours back, and we'll probably fill it up with straighten-up, clean-up tasks and maybe slip a corollary thing in there. There's been no - If you're thinking about M509 or some bigey like that, there's been no conversations like that whatsoever of, you know, getting a new big thing going in that time period. As far as the entry SIM goes, I think the basic philosophy behind that thing is that it has been a lot of days since either the ground or the crew has thought seriously about the CSM and its systems and its operation. It has been well over a month since we have simulated an entry with the crew in terms of passing the data back and forth that needs to get passed and computing the maneuvers on the ground. And so I would say that the basic philosophy of the thing is that in these long duration missions, when we have something as time critical as an entry sequence that requires a coordinated effort between the crew and the ground, we feel like it's been too long since we've practiced it. Therefore, we've scheduled a practice of it. Now in a - I'm trying to think of Skylab 3 and 4 - if we did a couple of things like that. We did an entry SIM; we did something else. I can't recall what it is right off the bat, but I believe we did - it escapes me. Anyway, similiar things are being done in Skylab 3 and 4, and there may be more of them, because the time is longer.

QUERY Well, how do you assess whether everything has gone properly? What do you look for - what are you going to be looking for?

HUTCHINSON You look for the - Well, first off, of course, there's a series of maneuvers that have to be computed. And on the ground, based on the crew doing certain things and based on the times that they pick, you look for a basic ability to meet the timeline. To make sure that we haven't got anything too tight, you look for a verification of the procedures - that everybody remembers the things they're suppossed to do and when they're suppossed to do them, both on the ground and in the air and especially in the air. The crew will be going through a complete set-up of the G&N and a complete set of switch touchings and throwings, where possible. And they'll have all their checklists out. We've updated their check - that's another thing. The checklists have been updated with any CSM anomalies that have occurred, like a transducer that isn't working or whatever, over the 28 days, so that we're actually tuning-up the checklist for the entry, too, if you will. The splash point. I'm not sure - I wish Phil was here, but the splash point may have changed a tad from where we planned it. In fact, I know it has because the groundtrack is a little different. So it gets people familiar with the numbers, et cetera.

PAO Bruce?

QUERY Yeah. On the same thing, Neil. Does the SIM take the exact same time as the actual undocking re-entry?

HUTCHINSON Yes, within reason. I am not certain if we run it all the way to the water - Up through the entire burn sequence, the final retro-fire burn in the initial entry programs - the answer is yes, it does.

QUERY Does the crew go through the installation of - mechanical installations of things like the probe and drogue and so forth?

HUTCHINSON I don't believe they install the probe and drogue. In fact, they don't. They do not install the probe and drogue.

QUERY So - -

HUTCHINSON We pick up effectively at separation.

QUERY Neil, what's the best time on the EVA start Tuesday?

HUTCHINSON I haven't got it. There - and there is one, too. You mean hatch-open?

QUERY Hatch-open.

HUTCHINSON We'll have to get him that, Bill.

PAO Okay.

HUTCHINSON EVA hatch-open time. I don't have it, Bruce, but it's been pretty well pinned down, I believe.

QUERY Okay, and we set back the crew wake-up one more time, don't we?

HUTCHINSON No, we're there.

QUERY We're there?

PAO Except for the morning of reentry.

HUTCHINSON Except for - oh, no, no - yeah - correct. There's one more - all done in one fell swoop. Right, on mission day 29 - or 28 and 29. That's right. The last they go to bed early, and the last sleep period is five - only five hours long - the sleep period between day 28 and retro-fire day. And then they'll get up 4 hours early on that day.

QUERY You mean 4 hours earlier than they are now.

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HUTCHINSON Yes, sir.
QUERY In other words, they'll - -
HUTCHINSON So we've flopped them back a total of 8 hours all told.
QUERY So they'll be up at - let's see, that's 10:00 CDT?
HUTCHINSON p.m. Yes. Yes, sir.
QUERY And so you figure - -
HUTCHINSON That's correct, and splash-down is roughly 12 hours after that, which is like 8:00 o'clock in the morning or 7:00 o'clock in the morning in the Pacific - or right after daylight, dawn.
HUTCHINSON Because 12 hours from that would be like 10:00 o'clock Houston time - a.m., in the morning.
QUERY I thought that was going to be right about 9:00 a.m. Houston time.
HUTCHINSON Okay. Well, 11 hours.
QUERY Is it 11 hours?
HUTCHINSON It's 11-1/2.
QUERY Thirteen. It's about 13:50 - -

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QUERY - that was - it was going to be about 9:00 a. m. Houston time.

HUTCHINSON Okay, well, 11 hours.

QUERY Is it 11 hours?

HUTCHINSON It's 11-1/2 --

QUERY Thirteen. It's about 13:50 GMT.

PAO Okay, we have one question here. We want to try and wind this up so we can catch the stateside pass. After undock, will they try to fly around TV or station keeping TV?

HUTCHINSON We will be doing the fly around after undocking per standard procedure. And there will be television coverage.

QUERY Let me ask one quick question before we go, and that is - Is there anything in the actual flight directing of Skylab that impresses you as being different from the way you - went to you in SIMs?

HUTCHINSON Different than SIMs?

QUERY Yeah, or different than you expected.

HUTCHINSON No, but I have discovered that it's tremendously different from Apollo in the fact that the flight directors are not capable of persuing problems with the same amount of detail they used to persue them in Apollo. That ought to be obvious. I mean you guys ask us questions that you would think we probably ought to know the answers to, and we don't. And that's mainly my opinion. There's more stuff than any one man could absorb all the intimate details of, which really means that we're relying a lot more on the operators in the Control Center to come up with the right answers and making reasonable misjudgements as opposed to doing some intimate technical details ourselves. But that's the big thing I've found. And I guess I never really believed it, even after all the SIMs, until I finally got in the mission and discovered how little I know.

PAO Okay, we'll cut it off right here. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

EVA Status Report
Johnson Space Center
June 15, 1973
16:37 p.m. CDT

Participants:

William Schneider, Director of Skylab Program
Bill O'Donald, PAO

SL-II PC-54A/1
Time: 16:37 CDT
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PAO Mr. William C. Schnieder, the Director of the Skylab Program. Bill.

SCHNEIDER Well, I don't have very much to say. I assume that the announcement has been made stating that we have decided that the parasol material on the thermal shield will last throughout the unmanned period and have therefore decided not to replace it or to cover it with the twin-boom thermal shield on Skylab II. Our current plans do call for us to cover the existing parasol early in Skylab III with the onboard twin-pole thermal shield. We will continue with the plans for EVA to retrieve the ATM film, this coming Tuesday. The only other note that I should add is that we will carry up on Skylab III a replacement parasol as a backup. In case all other things fail, we will still have a viable thermal shield on board that we can deploy.

QUERY What's the status of the alternate power?

SCHNEIDER Well, I reviewed the alternate power situations yesterday, and we decided that the probability of getting much useful power out of the rollup arrays and the fold out arrays was very low. In other words we got very little power for a very great effort. And we decided to, reluctantly, to stop all activities in that area. There were a great number of organizations that were involved in that, a great deal of excellent work in it and it almost would have come to pass, but not quite. We are continuing the development of the solar array module, the so-called SAM, that would be carried up for docking to the emergency port. There's been no decision made to use it or not to use it, but merely to continue its development for some further time.

QUERY Roughly, how much power would that produce?

SCHNEIDER Let's see, I think that's - some expense cost on Beta angle, and nominaly I think they're talking about 1-1/2 kilowatts, in that regime of useful power.

QUERY What does SAM stand for?

SCHNEIDER Solar Array Module.

QUERY Is there a possibility you wouldn't have to take it up at all, if everything continues to work as it does now, and the batteries don't deteriorate and things like that?

SCHNEIDER Yes, that certainly is one alternative.

QUERY What do your thermal tests show that the expected lifetime of this shield that you have up there now, the parasol shield?

SCHNEIDER Well, the best, we have not gotten to - the test have not been able to get to a terminal condition, because as you probably are aware, we expose it to sunlight

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and in order to accelerate the testing we've been exposing it to not only simulations of a single Sun, but also simulations of a double Sun and simulations of four Suns. That is the UV intensity is equivalent to what the vehicle would see if it had been exposed to a sun 4 times its current intensity. We have as a maximum, using those techniques, tested the material out to 1000 hours, which is beyond the Skylab III requirement, and have not had the material deteriorate down to zero strength and zero elongtivity. But we have not yet produced a time when the material will physically rupture. The materials experts that we convened yesterday were unanimous in their conclusion that there's no problem for 90 days and they were unanimous in their conclusion that it probably would not last for 8 months, and in between that, why, there's an area of uncertainty.

QUERY Why not just go ahead and put the one up next week while you're out anyway and then relieve the next crew of the job of having to do that?

SCHNIEDER Well, mainly because, obviously this crew has had many EVA activities and they are at the end of the 28 day mission and are very, very - -

END OF TAPE

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SCHNEIDER - - well, mainly because, obviously this crew has had many EVA activities. And they are at the end of a 28-day mission in a very, very hard working 28-day mission. And it seemed like a prudent thing to do, not to tire them any more than was required. And in this manner we'll not only start out with a fresh crew, but we will indeed be able to get back into the water tank and do several deployments and train the crew even better than the existing Skylab crew - 2 crew is. They were in the water tank once. And it would obviously be our intention to get the Skylab III crew into the tank and get them appropriately trained.

QUERY Looking ahead to SL-IV, have you set a launch date for that yet, or a period, yet?

SCHNEIDER No. There are - From a hardware standpoint, we would like very much to go as early as practical for the same reasons that we accelerated Skylab-III and that does remain an option. From a science standpoint, we'd like to optimize the earth resources passes. And we'd like to, if at all possible, see if we can get the comet that is coming into view around the last part of December. And we will be trading these things off in coming up to our decision. We have not made that yet. We're trying to analyze the pros and cons of the various pressures that we're getting.

QUERY What comet is that?

SCHNEIDER I should be able to tell you. I know the name, but I don't recall it. There is a comet that will - a very bright comet, that is coming close to the Sun. It will be, I think, as close to the Sun as any observed comet has ever come. It right now is almost visible. The scientist told me around the Christmas period it'll be visible to the naked eye as it approaches very close to the Sun. They're very exceited about it and would like very much to get observation from above the Earth's atmosphere. We're not at all sure that we can do it. That is merely one of the factors that we're putting into our decision. We'd probably use the ATM and we use all the instruments that we couldn't train on it. We originally were going to use T027. I'm not quite sure how we would use that right now.

QUERY Do you know how much replacement equipment you're going to have to take up on the SL-III mission, like, they're having a little trouble with the electron-beam gun and one of the ATM experiments, and several little things have gone wrong. Are there going to be a lot of replacement material to take up?

SCHNEIDER Well the things that we will replace that we hadn't planned on replacing - we're planning on bringing up the S015 and M55 experiments that had been eliminated from Skylab II because of stowage requirements in the CSM.

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We will carry those. We will carry up our new canister for the S183 French UV experiment. We will carry up a replacement for the S082A UV - NRL UV ATM experiment. Those are the experiments that we are replacing. The other ATM experiment that's had difficulty will normally be replaced at the end of the mission, so we will not plan on any replacement on that. We're replacing a couple of EREP tapes and bringing up a lot of film, as we had previously planned. And we're currently carrying up some bracketry for attaching the experiments that had been dropped out of the solar scientific airlock, in hopes that we can retrieve some of the scientific value of those experiments. And the objective would be to attach them externally to the spacecraft and bring back some data - to attach them during one of the normal EVAs. We are only planning on doing that on one of the experiments on Skylab 3, namely the 149 particle collection experiment. We will bring up the bracketry for all of the experiments. However, we don't think we can train the crew on those experiments by liftoff time, so we will - -

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SCHNEIDER We will bring up the bracketry for all of the experiments, however, we don't think we can train the crew on those experiments by liftoff time so we would plan on doing that on Skylab IV.

QUERY Bill, I have a couple of questions here, phoned in, from Bill Johnson of ABC. First, what is time of the EVA, Tuesday and the duration?

SCHNEIDER I'm afraid I don't recall the time, it's in the morning and it's early in the morning because we will be doing it in the crew morning period, and if my reccollection is correct, why that must be early in the morning here. It is a morning exercise and we would expect some, I think it's, the EVA period is about 2 hours, 2-1/2 hours, but the EVA preps make this into a full morning exercise.

PAO Okay. The second question from Bill Johnson, is will the crew have air-to-ground press conference, if so when?

SCHNEIDER The answer is I'm, yes, we have an air-to-ground press conference, the last time I saw the schedule, it was for the 27th, but that of course is subject to change, but, yes, we are planning on one at this time.

PAO Okay, do we have anymore questions here?

QUERY What, you probably haven't made any decisions on this yet, but what is the status now of the backup hardware, how far in these, this series of missions do you have to go before you say we're not going to use that or it doesn't work that way?

SCHNEIDER Oh, the backup hardware has completed fabrication and had completed fabrication prior to liftoff, it is in what we call a mission support status, that is we using the backup airlock module for example, to troubleshoot some of the problems as they come up in the flight. That hardware all exist and is complete, completed in fabrication has not been completely checked out and we had not planned to completely check it out. We will keep those equipments that are necessary for mission support until the end of the mission, it is our plan sometime during Skylab III, in all probability, to make a decision as to whether or not to continue with the backup capability or not. We have the name of the comet here, I'll spell it. Kohoutec.

QUERY Bill, you've had some various emotions and feelings as you've gone through this flight and they've changed up and down, how do you feel now about it?

SCHNEIDER Great, we got that flare, well that was a culmination of, not the culmination, but that was a great event that many of us have been looking forward to, and Skylab has, as I've been telling you now for the past few days,

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we're quite proud of it and we think it's a good mission, we think the scientific content of the mission and the results of the experiments is going to be very revealing and very beneficial to mankind in general. I feel very good about Skylab today, as you've said, I've had periods when, that has not necessarily been true, but right now, systems are working well, the experiments are working well, the crew is working well. We seem not to have either over worked the crew, or under worked the crew, our flight planning seems to be, have been well thought out, and we indeed are seem to be getting everything during the day that we had planned on doing, which has been very gratifying. Some of us hadn't worried that our flight planning techniques were such that they were going to tire the crew out, but as you know, we have as a policy to schedule a full day and we have done that and the crew has responded magnificently and the data that we're getting back shows it. So all in all, I think we've got a mission that the nation can be proud of. It's not done yet, I hasten to add, we've got some 7 months to go and one robin a spring doth not make.

PAO Okay, do we have any more? Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Background Briefing on television of ED31,
Bacteria and Spores Experiment
Johnson Space Center
June 15, 1973
15:59 p.m. CDT

Participants:

Story Musgrave, Astronaut
Doug Ward, PAO

SL-II PC-53A/1
Time: 15:59 CDT
6/15/73

PAO This is the Johnson News Center. We have Dr. Story Musgrave, backup science pilot for Skylab II, who will give us a narrative description of the replay for the student experiment ED-31. Dr. Musgrave.

MUSGRAVE Joe Kerwin, here, is taking out the container which has all the petri dishes in it, or the culture medium, to support the growth of the bacteria. He's fastening it down here on the IMSS Work table. Here he's taking out the leaflet that has the bacteria in it, and he's fastened it on the work table. He's taken a clip out that will hold the cultures for photography and he's placed it up on the light above. You can see in the foreground the forceps on the edge of the table that he'll use for inoculating the medium. He's making room to place another item on the table, using the velcro patches. He's picking up the forceps in the left hand, maintaining the tip off the edge of the table to maintain sterility of the tips of the forceps. Each one of those, so-called, agar plates has a culture medium in there, which will support bacterial growth. Here he's opening one of the plates. You can see by the motions of his hands, there, after putting that plate down - What his hands were saying is, I hope it'll stay there. This is the third plate that he's exposing here. I see he's looking around for all the patches of velcro that he can see, so that he can do as many plates simultaneously as possible. Now, he's opening up a packet which contains three separate discs of bacteria. And with the forceps he will pull out each disc and place this in the agar packet, within which the bacteria will grow. He's throwing something away in one of our trash lockers, there. That's a trash locker. You can see the difficulty he has getting things off of his hand. Anything which is wet, of course, has a tremendous surface tension. And anything which is wet, of course, sticks to his fingers. Now he has exposed three discs within that packet. He's picked up the forceps and he'll extract one disc. There's one disc. There's some notches along the side of the disc which tell him which side to put into the culture medium and which side to place up. That's very important. The bacteria want to be placed on the culture medium side.

END OF TAPE

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MUSGRAVE He's now closing the lid to that culture medium in that disc, being careful not to touch anything within inside, the culture plate, which might contaminate it with other bacteria from his hands. He then places it back in the container to be cultured either in the carbon dioxide incubator or outside of the wall of the spacecraft. That is the carbon dioxide incubator container which he is loading up with those cultures which will be exposed to carbon dioxide in the incubator. At this part in the sequence, he has completed inoculating all of the culture media. We have seen him do this to just one, but he has done that identical process for 15 agar plates. That incubator, he's installing it in that incubator now, which will maintain the culture medium at a certain temperature and will also expose those bacteria to a certain level of carbon dioxide. You can't see it within the field of view now, but he's taking the remaining culture plates and actually hanging them on a locker on the wall of the spacecraft. So, he's moving the TV camera now, and we'll pick those up on the wall. So, we have several different bacteria. Some of them will be grown in a medium of carbon dioxide at a certain temperature. The others will be exposed simply to the spacecraft environment. He's hanging them on the wall now, and they will be photographed at - after 12 hours of growth, 24 hours, 36 hours, and finally after 48 hours of growth. After this photography the samples will be put in the chiller so that their present state of growth and metabolism, will be held at a constant, if you will, be frozen at this state and then they will be brought back home. Although I can't be sure, at present with what's on the display, I think he was going after a, an accessory cable to bring electrical power to the incubator. That is not hardwired to the spacecraft and he has to get an - a transfer cable and hook that into a utility box and then bring it to the incubator.

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MUSGRAVE -- little demonstration of zero-g phenomenon. Again, it's not within our field of use; so I can't be a hundred percent sure what Dr. Kerwin's doing now. It does appear that he's lifting the culture plate up, attaching it to a photographic bracket, which is mounted on the light right overhead here, and then taking closeup photographs of the growth of the bacteria, which again he does at 12 hours after the inoculation, 24 hours, 36 hours, and 48 hours after the innoculation. And, again, although not within our field of view, I think he replaced the one he took a picture of already and took out another culture medium to photograph. While I can't speak for the principal investigator of this experiment, high school student Robert Steele, some of the important scientific conclusions, which might be drawn from this, is that how are bacteria influenced by the spacecraft environment? How are they influenced by a 5-psi environment of 70 percent oxygen and 30 percent nitrogen? How are they influenced by a very important factor - growing in a culture medium with zero-gravity? How are diffusion processes? How are they important? Now we can see a photographing of the growth of the bateria. The bacteria hung on a photographic clip, right on the light itself. You can see the brightness at the top of the screen. And Dr. Kerwin gets within 16 inches of the culture medium. He's taking a picture of that one, he'll then replace that one and get out another one to photograph. The microbiologists are very concerned about differential growth of bacteria and viruses inside a spacecraft. Not just the total growth, but does this environment favor the super growth of a few bacteria and/or diminish the growth of others? Some other interesting questions, which might be contributed to by this experiment are (garble) processes in zero gravity. Everything has a different density. Even within itself, different components of a cell have different densities. Without any gravity there would be no chance for any form of sedimentation within a cell to occur. Things like the nuclei and nucleoli and other parts of the cell which are heavier than their surroundings - There is a force, and they tend to sink within the cell. Of course, these do not occur - -

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MUSGRAVE - nuclei and nucleoli and other parts of the cell which are heavier than their surroundings. There is a force and they tend to sink within the cell and of course these do not occur in zero gravity. Within the culture medium also, there are no convective currents which would tend to circulate metabolic constituents which the cells need. Dr. Kerwin is continuing to photograph further of the culture media. He's finished the ones in the incubators now, and he's taking those that have been placed on the spacecraft locker. They have been exposed simply to the spacecraft environment instead of to a warmer environment of carbon dioxide in the incubator. You want me to narrate this? This looks like Paul Weitz riding the bicycle, the ergometer without a restraint system, and that's all. And commander Conrad preparing the next meal. We're looking up toward the top of the dome at this point. That's the hatchway leading to the airlock module and the docking adapter. What we call the fireman's pole in the middle, that helps up traverse a long distance from the top of the dome down to the experiment compartment. That's an inlet to the fans you see off to the lower left. We're now looking through the multiple docking adapter and the hatch you see in the center of that will take us to the command module. Our transportion to and from. He's floating with that in his hand.

PAO Okay, I believe that's all of the video replay and if any of you have any questions, we'd be happy to answer them. We do have, I see, a little bit of the ATM Apollo Telescope Mount video also, on this piece of tape. We can go ahead, I think at this point and pick up any questions on the ED31.

QUERY How much crew participation was there, with the, or was it student himself, I mean how much interface between him and, do you have any, I suppose I really should ask the student himself, but?

MUSGRAVE The crew had no interface with the student on this experiment. No, it, the normal experiment, we always have instruction from the principle investigators themselves and from the crew - -

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MUSGRAVE - On this experiment. The normal experiments we always have instruction from the principal investigators themselves and from the crew training people. These experiments came on very late and actually we just started seeing them about a month and a half or two before launch so we never had a chance to have instruction from the principal investigators.

QUERY You said that microbiologists were very concerned about the growth of viruses in a spacecraft environment, what do they plan to use - how do they plan to use that knowledge that you gain from this experiment?

MUSGRAVE I think concerned isn't the right word. They're interested in the growth of viruses and bacteria. This experiment will point out the differences between how bacteria as they grow down here on Earth and how they grow up there. Do they tend to have an overgrowth or an undergrowth - is there something up there that suppresses bacterial growth or is there something up there that enhances bacteria growth. That's the sort of information which you could get out of this experiment, although, of course, these are reasons that I have given for flying this experiment. And to really answer your question you'd need to ask the PI.

QUERY Then how will - once that has been determined what uses would be made of that information?

MUSGRAVE Whether we have a super growth or under growth? It'd tell you - we're going to a lot of effort right now in Skylab with biocides. In ways, those are things which discourage growth or kill bacteria and viruses. We're paying a lot of attention to this on Skylab and the materials that we have onboard - also we are sampling the crew - the skin of the crew. On a midmission point and toward the end of the mission we're sampling the crew and we're sampling about 20 or 25 different places around the spacecraft to look for bacterial growth. So depending upon how they grow, this would tell us how much emphasis we need to put on biocides or how little emphasis we need to put on them. That's one thing it'll tell us. But I think the most important part of this experiment is aimed at basic science. Things like sedimentation of intracellular components and that sort of thing. But again and partly here I'm speaking for the PI. I'm not the PI. I'm the guy who does it.

PAO Any other questions. Thank you very much, Dr. Musgrave.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 15, 1973
15:01 p.m. CDT

Participants:

Charles Lewis, Flight Director
Bob Gordon, PAO

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SL-II PC-52A/1
Time: 15:01 CDT
6/15/73

PAO Ladies and Gentlemen, Mr. Belton, we have Mr. Chuck Lewis, Flight Director off shift now. We'll let him summarize and if Mr. Belton has any questions and no other news men show up, we will start. Chuck.

LEWIS Okay. Today, we basically we went through our CSM Entry Systems Checks. That was conducted primarily this morning and all the CSM Systems checked out very well, no problems at all. No systems problems in the OWS or MDA today. And I think you had an earlier press conference about the time we picked up a major flare. So I guess that was one of the highlights of the day, the flare. But apparently the crew got to it quick enough to pick it up before it peaked out and of course they followed through with their post flare activity. Tomorrow morning we will have the CSM Entry Simulation with the crew, and subsequent to that we'll have normal experiment ops. That's about it in summary.

PAO Tom, do you have a question? This is an interview, not a press conference.

QUERY Are they adjusting to their new schedule, and what are their problems?

LEWIS They reported no problems, I wouldn't say they're adjusted, I don't think you can make a quick change like that and be completely adjusted, it'll take a little while, but they've reported no problems.

PAO Chuck, I think I, we're getting a lot of questions outside on what the Entry Sim will consist of, could you run over that?

LEWIS Well, I'm not the Flight Director that does that, but basically the crew will just go through their Entry Checklist, we'll uplink maneuver pads and so forth much like we do on Entry Day and just kind of a walkthrough with the crew to refresh them on the procedures, excercise the ground a bit with regard to the various computer loads we uplink and the various voice pads that we send the crew. And that's scheduled to take, I think we've got about 5 and 1/2 hours scheduled in the morning for that activity.

QUERY How about suit and unsuit?

LEWIS No, I'm sure it'd be unsuited.

QUERY Does this consist of undocking and that sort of thing?

LEWIS Oh no, this is, there won't be any undocking. It's just like I said, kind of a walkthrough with the crew on the procedures, checklist.

PAO Well, Tom, no more questions? I'll let Mr. Lewis leave. Okay.

END OF TAPE

family enough in the 28 days I was up there for one thing. But more important, I do believe that a more normal sociological environment - that a little more variety and so forth should be provided to a crew going on a journey that long.

SPEAKER You mean girls?

KERWIN Did I say girls?

SPEAKER No, I'm asking is that what you meant.

SPEAKER (garble)

KERWIN Okay.

PAO Nick Cris

QUERY A real quick one, tell me about that rubber duck - -

PAO Don, we'll try to get back to you. Let's - we're going to have to try to get as many as we can. Nicklos Cris.

QUERY - - Paul Weitz. Early in the mission, I forget the exact day now, but you recorded it on channel B, sighting of the space object, you called it a spaceship and it was just a couple of sentences that you sighted something and that was the end of it. You remember that, and can you elaborate at all on what you saw?

WEITZ Yes, I remember it; no, I can't elaborate. It was an object of some dimension that I saw behind us which then gradually - and it was obviously in a different orbit, then it opened and that was it.

QUERY How big was it?

WEITZ I don't know because I don't know how far away it was.

CONRAD Got no way of - We all saw - I'm sure they were parts of the nose cone; possibly it was the S-II. There are quite a few large pieces - our SAS panel, other SAS wing 2 is up there somewhere and if it didn't - if the solar panel part of it deployed that would be a very large reflective object also. There's quite a few large objects in relatively near proximity. I'd say near proximity I'm sure you could see another satellite 3 or 4 hundred miles away if it's illuminated right, just as you can down here on the ground.

KERWIN Yeah, I remember before we launched, standing down here on site and watching Skylab go by in the evening, and we counted, I think, seven different visible objects moving in the same general orbit; it could have been any one of those.

WEITZ Well I waited for the rest of the flight for the ground to tell us what it was but they never did, so - -

SL-II PC-81H/3
Time: 9:00 CDT
6/29/73

PAO Roy Neal.

QUERY You three were in great shape when you flew, and you stressed the exercise regime here this morning. I wonder if you can project downstream for us and look at perhaps a working space station and what chance does the average man have of being - say a factory worker in space based on what you've learned?

CONRAD I'd say very definitely that the average man or woman could fly in space. If you're talking about the shuttle mission, I don't think they have to do anything. You're talking mostly 1 to 7 days and they - I guess they're talking some 30 day orbital packages. I would suspect that if you went to 30 days you're going to wind up probably having to do something like Japanese factory workers do. Whether you're an exerciser or nonexerciser, if you're the laziest guy or the laziest woman in the whole world you still still spend 24 hours a day living in 1G, and that represents a certain amount of energy output on your part, and your heart and muscles are tuned to that. You're going to have to make up for it in some way, so I would suspect that if you just take the scientist off the street or a specialist out of a factory to do a job up there, if you're going to leave him up there 30 days, 60 days, 90 days, he's going to have to do some 4BX program or something that you've designed up there that the doctors can tell will keep his heart in good enough shape for him to fly the mission, but I think that's all. Now, maybe Joe's got a different approach.

KERWIN No, sir. I keep thinking that there are a lot of activities already that require you to be in a little better than sedentary shape. But if you want to sign up for a pack trip in the Rockies you have to be in reasonably good shape. It's that's kind of thing. Even in aviation, it's less true now, but throughout the history of aviation there have been certain classes of ill people who shouldn't fly in airplanes, and I think we're working toward that sort of atmosphere in space.

CONRAD Yeah, we sort of had a old man's reentry. I don't think we got over about two or three-quarter g on reentry, so we're getting our reentry loads down and boosted flight. Of course, we - since we're not riding the TITAN anymore we don't see anything over about 4g's on launch and I don't know what the shuttle profile is but I think it's lower, probably. About the same. And I think Joe's points are extremely valid on reasonable, physical, normal health. Anybody can handle 4g's for a couple of minutes, you know. So I think that the man and woman in the street can fly in space and I think they probably will.

SL-II PC-81H/4
Time: 9:00 CDT
6/29/73

PAO Carolyn Callahan.

QUERY I wonder what kind of housekeeping tips you have for SL III?

WEITZ Stay on top of it just like you do in a house. You got to - you got to clean those screens about every three days. You got to wipe down the wardroom about every three days, it's simple as that. You got to keep it clean.

CONRAD You'll - you'll undoubtedly get to see - we haven't seen them yet. That was the last to be processed - the onboard 16 millimeter. One of the experiments was the photograph eating for different times in the flight. They were looking to see if we changed our - our learning of eating and various tasks. We photographed more than once during throughout the mission to see how we adapted. And I think you'll see all the time that we're eating, continually somebody's reaching out. They're either getting a ball of water or a ball of gravy or something that got away. Or either you'll see a guy reach over and wipe off a panel. Because Paul's right, it was - if we did spill anything it was very obvious and we normally cleaned up right then and there on the spot, stayed on top of it that way. It was very obvious when anything needed to be cleaned. Let me say that environmental control system, both in the waste management compartment and throughout the cluster, was outstanding. I don't remember a smell 1 anywhere except where we kept the garbage. At one time in the flight we noticed that the food tended to get up under these lids that we had, and soon as we spotted that one we cleaned that about every 3 days with - What was that stuff? Zefrin wipes and really that was all it was to keeping it clean. I think the guys will find it as clean - just about as clean as when we got in it, which was super clean.

KERWIN I think that's a point that needs to be made, Pete. All the talk about the Skylab mission was all the things that went wrong and how some of it managed to get fixed. There were so many things that went beautifully right in that mission. We hardly talked about any of them but environmental control, the general cleaniness of the spacecraft, the operation of most of the solar physics experiments, the operation of all of the medical experiments, and a long catalog of equipment that was designed by smart hardworking people that worked just exactly the way it was expected to.

QUERY (garble).

KERWIN Yes, I did bring back the rubber ducky, and - -

END OF TAPE

SL-II PC-81I/1
Time: 9:00 a.m. CDT
6/29/73

KERWIN Yes, I did bring back the rubber ducky. And I guess I missed my family more than anything else.

CONRAD I couldn't hear the question, what was the question, Joe.

KERWIN The question was what did you miss the most.

CONRAD Oh.

WEITZ What did I miss the most? I'm sure I missed it a couple of times. I think the freedom of diet. Really, it gets old after a while, having your dietary intake restricted. So, I guess I missed the cold beer most of all every now and then.

CONRAD I can't put my finger on anything except a couple of particular times, I think they are obvious ones. When I talked to my family on my birthday and on my anniversary, then you become very aware that everybody is back on the ground doing normal things. My wife said she was going to the ranch and everything. And you get yourself disassociated from that when you're up there. You're running this vehicle, and you're thinking about it. And I think you occupy your mind with that. And it would certainly bring me back to, you know, the normal things that are going on the Earth, and you do miss your family and so forth. But, those points were brought home to me the couple of times that I talked to my family.

QUERY Pardon me. You talked an awful lot about your physical profile during the mission changes and that. How does the phycological profile, particularly in moments of solitude or prior to going to sleep at night. You know past zero g experiences have talked about moments of euphoria, particularly during EVA work or moments of reflection. Did you experience this sort of heightened awareness in zero g?

CONRAD He's looking at me.

WEITZ He's looking at all of us.

CONRAD Don, my dumb clod American approach to that in that I tried to keep things as much as they were on the ground, so I went to bed in the evening, I got my country music out, put on my ear phones, get out the book and read that thing, and finally fell asleep. And that's essentially what I do on the ground. I listen to music most of the time during the day, when I have the opportunity when I'm at work, or in the evening. I just tried to keep a normal routine, and I didn't - I guess I'm not very big on heightened awarement or any of that balony, but I didn't notice any of it.

WEITZ No, I didn't notice anything out of the ordinary either. I think primarily I said it 30 times, and I'll say it a hundred more, that I can't say enough for the fact that we had extremely high fidelity equipment with which to train. And therefore there were many times that you could look around and you didn't really know that by the time you have become accustomed enough to zero g, you didn't know if you were in the trainer or you were in the vehicle. And I think therefore there was no difference in the EVA when my friends were kind enough to let me outside. And for one thing you're kind of hidden in the past where I was. And we've done it in the water tank, and it could just as well been in the water tank cause we had darn good training gear.

KERWIN It reminds me of the old medical sob about not finding God in the pineel glandar for he doesn't exist. At the risk of getting religious, I think God is in space in the same way and in no different way then he is right here.

CONRAD You brought out a good point. You asked about arguments, I remember the only argument we had was Joe and I had, if you want to call it an argument, a discussion about whether he should go EVA with Paul or whether I should go EVA with Paul, because we wanted Paul to go EVA. And Joe won the argument by pure logic which is the way we had trained. We had trained for Paul to do my job, and me to do Joe's job, and Joe had trained to do my job, and therefore he won by logic and I went twice. And I think everyone should know it was Joe's idea to let Paul go, which I thought was extremely nice because originally it was not going to be that way.

QUERY I had a couple. Pete and Joe, first of all, on any time on your EVA were you at all worried about any danger involved with any jagged edges that you might have found on the wing? Or were you quite surprised, as I kind of noticed on some of the channel B that the wing did come up when it did? And Pete, are you at all worried about your addiction to butter cookies?

CONRAD No, to the answer to the last one. And let me say I believe I expressed this over the open loop. My only concern about the EVA is that we would not get the job done. And I should qualify that by saying that as you obviously noted, and I've already seen a lot of people have picked this up and written about it. If you prepare correctly to do a task EVA and give the astronaut a proper restraint there is vertually nothing that he can't do out there that you could any place else. You could work tools, you could transfer film. In doing these things, we spend many hours in developing foot restraints, putting them in the right location. hand rails, and then here they come and say whistle down the slick side of the vehicle and whip out this solar panel. Well they spent a great deal of time on the ground, they worked in the water tank, and they had a great deal of confidnece that it could be done. I guess I didn't have quite as much confidence that it coule be done for one reason.

And that is the one place again that you can got trapped I think. In the water tank, there is a certain damping factor by having water around you. And you can almost, if you make a mistake and start to slip off something in the water tank, the fact that you don't completely whistle away from it cleanly gives you a chance to recatch or regroup. And I was concerned that with no proper restraint out there that we would get in what we refer to now as the trap that Dick Gordon got into with me on Gemini 11 where he just flew around there and just beat himself to death because he didn't have proper restraints. And by golly, that's the problem that we had out there. Joe was just working himself to a frazzle without the proper restraint. We did it exactly the way they said and finally we had to do something different. We got Joe tethered, tightened his tether on his chest, he did, where he got both feet planted and he could take a good strain on that tether with both feet planted which gave him three point suspension. Bang. He hooked it up right away. As soon as we got that job done, it was down hill from there because we had, you know, restraint, and we were able to hand hold out over the pole, and hook up the BET and all the rest of the things. That was my concern. I wasn't concerned about jagged edges or anything. I had seen enough of it from the spacecraft to know where it was and to stay away from it.

QUERY Under the risk of making a federal case out of it, could you describe for us how you did feel upon recovery, and what sicknesses you accounted.

KERWIN At the risk of making a federal case out of it. The sensations during recovery itself were essentially normal. We all felt, and I felt in control of the situation during the reentry g's. Splashdown was not overly hard. And I felt great in the command module, I took everybody's pulses. Incidently the average resting pulse was, I think 81. And if each of you wants to feel his own or his neighbor's pulse, that's probably pretty close to what you're all running here on the ground. I had then hustled down into the lower equipment bay and got everybody a strawberry drink, and chug-a-lugged the strawberry drink, and immediately I knew I had made a serious mistake. You know that feeling that you get. As Pete's says, I was a little bit siked out, not only by the stories of previous experience, but by the very good experience we had in flight, and by the results of the M131 experiment. The farthest thought from my mind was getting sea sick, but that's what happened. I just got progressively sea sick. I noted the same vertigo and the same heaviness of the limbs that the other guys had. But super imposed on that was this awful feeling that the world was about to swallow you up, you know what I mean, it's no worse than a hang over or anything else, but there is and you've got to struggle through it. And it stayed with me through the entire day. I'm not sure I've read about hang overs in the medical literature. Naturally you feel better after you throw up, and I managed to accomplish that feat about 3 hours later. And it was up hill from then, or down hill rather, whatever it is in one g.

QUERY As you know with the coming Apollo Soyuz flight, there is more and more pooling of medical information. And some of us are still puzzled about the difference in post flight especially reaction that you gentlemen have had and some of the cosmonauts have had on flights of less duration than your own, and some of you have talked to the cosmonauts. How do you speculate now on why this difference has occurred? They've got extra space as you have, and they have exercise devices aboard, they have roughly the same atmosphere. Why is this difference? How do you speculate on that?

KERWIN Inter individual differences, somatics, and maybe cavier, in that order.

CONRAD Correct me if I'm wrong. I believe the 18 day mission went in Soyuz. And the only manned mission was the 25 day mission that was done in the Salyut for any duration and they did not recover that crew. And I venture to say that again had we spent 28 days in the command module I think you would have carted us out of there again. And I have the feeling that the 18 day guys who said it took them 5 days, they had to be carried from the vehicle and so forth. I believe they were in a much smaller vehicle, and I don't think they got the exercise like we got the exercise up there. And I would attribute along with what Joe says primarily that was to the size of the vehicle, and the amount of work that was done. I think the other thing I should say is we all found that we did a great deal of nothing essentially our of our arms and shoulders. We did a lot of tasks turning tools, you know. Instead of this business of you turn the tool, and you're going to turn the other way, and you got to really be restrained, you can hang on with this hand torque a tool, you can throw your body in it. You could use momentum to start something - -

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CONRAD turn the other way and you've got to really be restrained. You can hang on with this hand. Torque it to it - you could throw your body in it. You could use momentum to start something working then you broke a bolt lose, you turned it. Now I think they gave us a lot more exercise on our arms and upper torso than we expected to get also.

QUERY Dr. Kerwin would you comment on that?

KERWIN On Pete's comments.

QUERY No, on my question of the difference between the cosmonaut reaction and yours from a medical standpoint.

KERWIN I agree with what Pete said but I think basically that it's scattering the data. That's what I meant by enter individual differences and partly in schematics by which I mean the way individuals describe and the way we understand what they're saying. I don't think there's any basic physiolocial difference between Russians and Americans.

QUERY Since - the reason for this question is that since body weight and fluid balance and so forth are so dependent on salt - did you notice any difference in your appetite for salt either during or after the flight?

WEITZ Differences in appetite for salt before and during the flight. No. Now let me say something about my weight loss - that was kind of induced. Pete was going for the gold star. He wanted to eat everything because he didn't feel right about getting butter cookies without having eaten everything that day and he wanted those butter cookies. Where I started around the first of the year after the holidays with the goal to lose some weight and I think that if you'll look over my weight history since right after the new year is I have been continually losing weight since. I knew I was losing weight in flight and I didn't mind. And the foods I didn't like I didn't eat. That's why I lost weight.

QUERY I guess it falls for me to ask since no body else has about the ATM. Pete, you said before the flight that you were really looking forward to working with it and it was apparent that you were enjoying it, especially when you saw the flare. Do you think that man is necessary and desirable for that kind of experiment? Let me rephrase that. Is man cost effective for that kind of experimental work in space?

CONRAD There's a simple answer, yes. Paul gets the gold star for finding the flare. He was at the panel at the time. Let me say that I hope that it'll come out from the PIs that yes, in fact, we did do a good job because we couldn't just point it without having an understanding of

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what was going on. And again we have tried, I think, to utilize Skylab in the same manner that I've always told you that, I think, the term astronauts applies uniquely to a breed of person that will come and go and we will go back to the normal way of developing vehicles. And I think you should see this in the Shuttle. You going to need the test pilot. Tthe guy that have my kind of background come in to develop the Shuttle and then you're going to have the operator pilot as the airline pilot is today or the commercial business pilot is today come in and operate the Shuttle vehicle and then the payload becomes either manned or unmanned and you put the true scientists up there today. We spent a great deal of time learning as much as we could to be good solar physicists and observers. And I think - I hope that we earned our A's in that for the PIs. And I do feel that the day should come the PI should be up there running his experiment and certainly when he gets up there he should run it better than I am. He is the expert in it. And - but I think that we ran it better than just the guy in the street did. And so we're the step in between again.

WEITZ There is another subtle pointer that I think is often missed. It is of benefit not only to the experiment to have an individual running it who is qualified in that field of science, but it's a benefit to that individual long after he gets back down. Somebody asked me once about Jack Schmitt in that line. I think Jack will be a more intelligent, more aware lunar geologist for the rest of his life because of his experiences in Apollo.

PAO With a reminder that we do have SL-III briefings for the rest of the day we'll end this. Thank you very much.

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SKYLAB NEWS CENTER
Houston, Texas

SL-II Postflight Review - Crew Health
Johnson Space Center
June 28, 1973
4:47 p.m. CDT

Participants:

Dr. Royce Hawkins, Deputy Director for Medical Operations
Bob Gordon, PAO

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Time: 04:47 p. m. CDT
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PAO Okay, ladies and gentlemen, we're sorry for the delay, but Dr. Hawkins is a busy man, so without further ado, Dr. Royce Hawkins, Deputy Director for Medical Operations at the Johnson Space Center.

HAWKINS Good afternoon. I'm sorry again to have to apologize to you for being late. It seemed like I've been running pretty late for a lot of these meetings with you. But let's say that today has been a pretty important day to all of us in that this is kind of the kickoff of the flight readiness reviews for Skylab III. And so it's upon us, and we are really beginning to feel it. I might try to just recap briefly that we have covered an awful lot of ground, but I think, all in all, at least at this point, that things look to be in very good shape for the launch of Skylab III. There's still a lot of open items that have yet to be closed. But I think, all in all, it looks very, very good. Now, what I had planned was really to try to recap briefly what had happened and then concentrate on the time since the recovery as to what has happened to the Skylab II crew. I think that most all of you have been present, and certainly are aware of the weekly progress from the get-togethers that we've had to try to keep everybody updated and apprised of the developments. But, to look back over the mission, we had, in the major medical experiments, the M092 and the M171 studies, very interesting findings that were a little surprising to us. With the 171, the bicycle ergometer study, we found that the crew, all three stayed right within their preflight baseline envelopes. In the 92, we did see some changes and some individual differences, three individual differences in the crew, in their particular response to the lower body negative pressure study. Now, in the immediate postflight, we had again three individual variances in the response that we saw in these three crewmen. All three of them did experience vestibular disturbance that lasted about 3 hours in the commander, about 8 hours in the pilot, and it was through the R plus 1 day, up until the R plus 2 day before he was completely free of any symptoms, SPT. Now, the response postflight then, in the lower body negative pressure testing, we found that certainly all three did exhibit some degradation in the cardiovascular response to the negative pressures. This was certainly not unexpected, as we've talked about before. The science pilot, with the vestibular disturbances and the orthostatic hypotension that he demonstrated, he was unable to complete LBNP that day, and was not subjected to the 171 run on R-0. The other two crewmen did complete the runs, both the 092 and the 171, but they were definitely running higher pulse rates,

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heart rates than they were in the preflight baseline measurements. Now, it - we ran them on R-0, R plus 1, R plus 2, R plus 4 back here, and that is the last measurement that we have in the major medicals. Now, all three crewmen are still not back to baseline as of R plus 4. They'll - the pilot is very close, and I would say that the commander is probably next closest to his baseline measurements, with the science pilot still the farthest out, but all of them approaching very, very closely to their preflight measurements. And I think that the next evaluation of these patameters will be on Saturday now. I think that we will find that they will probably all be well back on baseline levels. The other very interesting study and very interesting findings were, I think, with the 131, the M131-1, which was the motion sensitivity test. Now, preflight, we established what was a baseline level and a specific rpm rate of rotation for each crewman, in which he would undergo a certain amount of head movements. Now, preflight, and remember we only do this on two of the crewmen, the pilot and the science pilot, we established their threshold level of motion sensitivity, the point at which they would begin to develope symptoms of motion sickness. With the commander, I mean the science pilot, his rate of rotation was 12-1/2 rpm, under which he could do 50 head movements before onset of symptoms. With the pilot, it was 15 rpm and 40 to 50 head movements. Okay now, in flight then, we saw a very dramatic change in both crewmen, where they were doing 150 head movements at these rotational speeds, without any symptoms whatsoever. And then, if you recall, we gradually increased this and the rate of rotation, first to 20 rpm, then 25, then finally, on the last run they made in flight, at 30 rpm, and they were still doing 150 head movements without any symptoms. Now, post-flight, we saw some very definite vestibular disturbances in all three crewmen, with nausea and even vomiting in the one crewman, the science pilot, at about an hour after he was aboard the ship and in the medical labs. And his symptoms with head movements persisted through the next day, where any movement of the head would precipitate the onset of dizziness or vertigo and stomach awareness. Then this completely cleared, subjectively, in all three crewmen by the end of R plus 1 day. R plus 2, they had no problems whatsoever. You remember they made the trip to San Clemente that day. They flew the helicopter ride satisfactorily, without any problems. They returned to the ship. We conducted the R plus 2 physicals, and then they immediately boarded the plane to fly to Houston. On R plus 3, we performed the first M131-1 study postflight, and that was done here. Now then, in both crewmen, they were able to complete the original baseline rpm --

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HAWKINS - M131-1 study postflight, and that was done here. Both crewmen - they were able to complete the original baseline rpm, 12-1/2 for Joe and 15 rpm for Paul, but they were able to complete 150 head movements without any symptoms. Remember that preflight they were only able to complete 50. So there's still some evidence there of some - some adaptive change that did take place in flight that was still present postflight at R plus 3, in spite of the fact that we did see a lot of vestibular disturbances immediately postflight. We're still trying to look at this; we have not yet really had a chance to sit down with the principal investigators for this area, Dr. Miller and Dr. Graybiel. We will be doing this and, again, we will be measuring the second M131 in both crewmen on Saturday. That's about it, Bob.

PAO Okay, gentlemen, ladies, please wait for the mike; right here.

QUERY Doctor does this all suggest that perhaps all three became seasick and that was the reason for their disability on recovery?

HAWKINS Well, I think definitely you've got to rule in some actual seasickness that perhaps, maybe precipitated the onset of this thing; however, I don't think that the persistence of it that we saw was anything other than a change that was taking place again in the postflight period. I can't help but feel that this is a readaptive process that's taking place in the vestibular system to the one-g conditions. I think very definitely there's an awful large amount of that.

PAO Bruce Hicks.

QUERY Have any previous tests on these crewmen or anybody else that you know of shown this progression, this adaptive change that you noted in the 131 or similar experiment?

HAWKINS Preflight - in the pre - like Apollo flights, are you talking about?

QUERY Well, yes, either Apollo, or even ground tests. In other words, what I'm trying to say, is there a direct relation between spaceflight and being able to come back and do 150 head movements instead of 50?

HAWKINS Well, we really don't have any good data on this, see, to compare it with, because we've never had the opportunity of measuring that in flight before. And right now, postflight we haven't seen anything quite this dramatic at all. There's been changes and definite deviations from preflight evaluation in those Apollo flights where we did study similar - perform similar studies, but nothing that was quite this dramatic.

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QUERY What does this indicate to you, other than it's an adaptive change. I mean, what does it mean? You know, is it great the guys can come back and get dizzy in the whirling chair or what?

HAWKINS Well, we're on a frontier and we're learning and we're trying - as we identify these changes, then we've got to have a chance to analyze the data to really have a - come up with an understanding of what it really does mean to us. It could well mean, okay, as I think, we're learning; this is a part of the adaptation that must take place under these set of conditions for a crewman - for a human being to perform satisfactorily in this environment. And then you subject him to a return to one-g conditions, and he has to readapt. And he has to go through a change that alters his physiology again to restore it back to what he saw previously. Now, what does this mean in the way of - to future flights? Are you going to have to provide some type of protective mechanism, to develop some set of procedures or some type of training exercise that they're going to go through that's going to alter this, of course? These are questions that we've got to look at and try to answer.

PAO Arthur Hill.

QUERY Okay, Dr. Hawkins, would you say that the Skylab astronauts are - how would you compare the rate at which they are readapting to Earth's gravity with the experience of the previous Apollo crews? And, also, if you think that between now and Saturday, when your next examination comes about that they are going to be back to their preflight norms, why are you going to wait until Saturday? Isn't it important to find out precisely when they're going to do this between now and Saturday, if you think by Saturday that will be done.

HAWKINS Yes, it's very true Art. But we're caught up here within an operational problem, with the amount of time that we have to do all of these good things. Now like yesterday and today, we've been - we've had all of our people tied up doing F minus 30 examinations on the Skylab-III crew, and we're just one man deep in so many areas. We've got to spread some of this out. We really feel like this Skylab-II crew is close. They're really close to their baselines at R plus 4. Yes, I'd like to have seen them again on Wednesday and again today, if it had been possible, but it just really wasn't.

QUERY The comparison, are they readapting more slowly, faster, or what?

HAWKINS Well, I think the - very definitely I think they're slower in the - than what we saw for the majority of Apollo crewmen. We did see in one crewman in Apollo 15 where Dave Scott and Jim Irwin both were slower than what we saw for other Apollo crews in returning to baseline. In fact, all three of those Apollo 15 crewmen were slower in returning for some reason. And Jim Irwin was really the longest at R plus 5.

PAO Roy Neal.

QUERY Royce, so far, you've covered cardio-vascular response and motion sensitivity. I wonder what other changes or what other bodily functions might have been affected, if any? And, also, did you notice any leveling off here of the adaptation process with these men over their 28 days? Any way that you could pin that down?

HAWKINS Okay, about the leveling off, I thought, at several times, that we did see leveling off. And yet, then we would see again a change. I'll give you an example; that's the best way to do. With 092 on Joe's first - well let's see, his third run, he - we saw the first change in his performance capability. And he had to terminate the minus 50 negative pressure run. Therefore, we put him back to a minus 30, minus 40, minus 40 for the balance of the mission. And then it was on the - let's see, I forgot the exact number, but it was about the third to the last run he made then, he was doing - right up to that time, the second time where he was unable to complete the last minus 40 run, everything looked stable and then it all - he broke rather suddenly then. He was not able to complete that last minus 40 exposure. So it was terminated after 7 minutes into that run. And then he stayed at that lower level then through the remainder. Now, Paul showed his first change at about his seventh run, I believe it was. And he never showed a change again, although I kind of feel like that had - that there was a slight change and a slight trend toward increased heart rates as we look back, and as the flight progressed there where I felt like - -

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WILMARTH - we - as we looked back, and as the flight progressed there, where I felt that had we probably ran him another time or two, we would have seen a similar change, as we had in Joe. But it - Within that time duration it didn't happen. Pete's was - The only thing we really saw there was elevated heart rates over the baseline values. And he was always able to complete his entire protocol. Now, with the exercise response work performance - They stayed right in there into - in the preflight baseline envelopes, throughout the whole mission. There wasn't any - there wasn't - There was no trend whatsoever, of deviation. And - (laughter) - -

QUERY What other bodily functions - -

HAWKIND And then - -

QUERY - - have you observed?

Hawkins And what other bodily functions? Well, okay, now I - those were the - the measurements were - and were - Here, we're looking at gross physiological changes and all. We have not yet really got any of our laboratory data in hand, other than some of the - the hematologies, which the immediate - immediate postflight hematologies. Now, all the chemistries and the hormones, endocrine studies, all this is - is still coming forward. It's being processed; we did get all the inflight samples back. T hey're in good frozen condition, and these - these were immediately put into the lab and started through an - analysis. But, it's still just a little bit early to have those initial results back, and I don't have them at this point to really say what changes we might be seeing there. We'll get them back sometime over the weekend. I hope that we will begin to get some of the early - early data out.

QUERY I just the key to the thrust of my question - and I'll stop here. Al Bean, for example, said he's going to walk out of that capsule if he physically can. And I guess I'm asking you to extrapolate just a little bit whether you think he's going to be able to do that after 56 days?

HAWKINS I would like to - I guess I would like to have a chance to look at a little more of his baseline - preflight baseline data, Art, before I commit myself too far. I'll say this, I think Al's a pretty fine guy and I think he's a pretty determined guy, and if determination has anything to do with it, he's probably going to do it. But, here again, I think within Skylab III - We're going going to be flying again three different individuals, and I don't doubt but what we would begin to see some - some individual variances here - from what we saw in Apo - Skylab II. And although I feel - I personally feel confidant about - about what we have seen thus far, and granted, we still have to look at all the inflight samples that were brought back yet, to - to have a complete understanding of what man's response is to this environment for 28 days. I still feel confident that it's going to tell us that "yes, we feel he can - He can fly a 56-day mission."

QUERY Royce, R plus 4 was your actual last physical exam. And at that point you were still seeing elevated pulse rates? And - presume an elevated blood pressure. Can you give us an idea of what you were saying in numbers of - and the baselines?

HAWKINS Jules, I don't have the exact heart-rates here with me. If you'll let me just - like - tell you in terms of Deltas. Maybe that might suffice for our - I can dig them out for you a little bit later. Bob ran over and grabbed me out of that conference, and I didn't have time to get too many of those individual data points with me over here. But the - let's see - like - Like from their baseline, we were seeing - oh, 10 to 15 beats - and closer to 15 beats higher in the resting heart rates for the crews with a - with a similar elevation at the - under the work stress. Now, this is immediate postflight. Whereas inflight, for the 092 now, there were - Remember 171 was right on the line. So, M092 inflight, they were running somewhere around - oh, five to 10 beats higher, very - fairly consistently. Now then, at R plus 4, then the last measurement we saw - well, even R plus 1 and R plus 2, this delta began to drop, and it began to narrow. And they're running about five beats higher - five to eight beats higher now, than what they were baseline.

QUERY How about blood pressures?

HAWKINS And the pressures were not a lot different than what we really saw in the - in tthe preflight period. They're not - they're not - There's not that much significant difference there. And that's true inflight too,with the blood pressures. They seem to hold there until at such a point they begin - They would break. They tend to reach their threshold level. And then you'd see a rather dramatic drop in them.

QUERY This is probably asking you to extrapolate prematurely or anticipatorily, but do you see anything in your findings so far that lead you to think you are going to call for exercise changes or modification of exercises to enable Bean and company to do the 56-day mission better?

HAWKINS Right.

QUERY What do you see?

HAWKINS I think that - I think we've seen one very interesting thing here in this crew. And, as I say, we've seen individual differences here in performance to the - the M092. We've seen differences in the postflight period to all of the measurements, and there's - I think one very outstanding finding in the inflight period, is the amount of exercise that these - that these three crewmen performed. And if you line up their performance, inflight and post-flight, with the amount of exercise that each one did inflight, you'll find that Pete did the most exercise, and he really showed the least change. Paul was next, and Joe was last, in the amount of exercise they performed. I - You can definitely correlate it with the results that we see.

QUERY You're going to call for them to exercise more?

HAWKINS More.

QUERY Any - Any new exercise devices or methods?

HAWKINS I don't know that we - I don't know that we need any - really any new devices yet, Jules, I think the - the exe - the - ergometer is certainly a - a wonderful tool for this. But, we gave them 30 minutes for Skylab II, and I know Pete used every minute that he had available to him, and he worked hard at it, and religiously. And, the other two a little less so, and it shows up because we have the actual wattage of energy that's been expended throughout the whole mission on their personal exercise program. So we're really going to recommend, very strongly, that the Skylab III crew have at least an hour, preferably maybe an hour and a half of personal exercise time.

QUERY Is that per day?

HAWKINS Per day.

QUERY You said on the Sky - referring to the Skylab III crew that it looked good but there were still a few open items yet. Could you elaborate on those open items?

HAWKINS Well, - oh, gee, - I - I don't whether I could or not. These are like cameras that, you know, are still being evaluated - Well, no. We don't know - We don't have any real significant open items in the way of - of problems. These are items that have yet to be closed out, like the physical examinations to be done down the line. No, I think - I think our hardware is - anomalies, and everything have been pretty well worked. For example, the leg bands, if you'll recall, that was another significant finding, an interesting finding, that we found in Skylab II, and very early in flight, too, where the calf circumference decreased. And we say rather - very significant deltas during the negative body - lower body negative pressure testing, were in the leg volume - very significant changes. Okay. Now, as

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the flight progressed there we found that the size leg bands that we used to measure the - the leg volumes with, were too large. Now - So we're putting aboard some smaller sizes - -

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HAWKINS - the leg volumes with, were too large. So we're putting aboard some smaller sizes, in the event that we see a repetition of this in III.

QUERY Are you going to have the crewmen exercise every day on SL-III?

HAWKINS That's what we're recommending. Now that hasn't been worked out yet. I mean, that's just - that has yet to be fed into the Program Office for management consideration. Now this will have to be worked with a lot of the other time - you know, a lot of the other things that are in the time lines. It's obviously going to take a lot of time out of something. And I don't know what that really means yet, but that's a personal recommendation at this point, the way we look at it.

QUERY Have you seen, on previous flights, any indication that the speed of recovery was corollated with the amount of exercise, or is this new to Skylab?

HAWKINS We've never had this accurate a measurement of personal exercise before to see.

QUERY Blood pressure and the persistance of blood pressure and increased heart beat, is that something - is that length of persistance to R plus 4 greater than you've seen in earlier flights?

HAWKINS No, not greater, really. The Deltas are really not - not really much different than I guess what you'd, you know, if you lined them up with each of the previous - Apollo missions, you know, and Gemini, but the time duration, I think, is really one of the critical things.

QUERY Then you're thinking of actually doubling the amount of assigned exercise time from 30 minutes to an hour a day.

HAWKINS Yes, that's what we'd like to see them do. I think it would be beneficial, really.

QUERY With your experience now, do you - with the total experience, do you believe that air experience plus space experience - the amount of air experience plus the amount of space experience represents an important factor in this adaptive process, the total adaptive process?

HAWKINS Okay, you mean now, the amount of actual flying time that the guy -

QUERY Yes, flying time plus space time.

HAWKINS Well, I haven't, I really haven't had a chance to try to corollate their total flight-time history with the symptoms we've seen. I think that's a good point, really, which I think would be good to try to look at. I must confess, I haven't had a chance to do it though. But what we have seen, at least in Apollo, was the amount of acrobatic flying that the crew would do just prior to a mission, which did seem to have some beneficial effect. It is some conditioning or preflight conditioning of the vestibular system, so that the crews, I think, that did undergo this, following Apollo 10, perhaps may be - you perhaps could say yes, they did seem to do better in that initial early few hours of the adaptive processing. But it's hard to quantitate that really. I know that Tom Stafford, he's the one that advocated this and he really took his crew out and really wrung them out in acrobatics just prior to the Apollo 10 mission. And not a one of those guys had any problem. They didn't show symptom one, really. But subsequent to that, other crews tried to do the same thing; I don't know what amount of flying time they were able to squeeze into their busy schedule, but the - we did see motion sensitivity problems develope early.

QUERY How much weight did each man lose?

HAWKINS Okay, let's see. Preflight weights on the commander was 136.75; science pilot, 171.25; pilot was 175.25. Now the last inflight measurement that we had was commander, 133.9; science pilot, 166.2; and the pilot 169. Now then R-0, the immediate postflight - postrecovery weight, then, for the commander was 132.7, the science pilot was 163.75, and the pilot was 167.5. By the next day they had, well, the commander and the pilot had picked up just about a pound, and the science pilot was down a pound. Well, I think it really, it isn't a lot different from what we have seen in previous crews. Paul showed the greatest loss there, which looked like, what, about 6 pounds over - no, wait a minute, about 9 pounds over his preflight. That's a - I think that might possibly be about the most weight loss we've seen in any one crewman, but we've seen others that have run up to 6 or 7 pounds.

QUERY Do you suggest anything about a change in eating habits on the next flight?

HAWKINS Actually, I think the - really, I think the crews have done real well by their diet. And I don't really contribute this loss to any nutritional deficiency. I think they had adequate diets. They did eat all of the food, for the most part. Pete, I guess was really the best at eating everything. But at no time did he complain of being hungry or feeling that he had an insufficient amount of food. And I'm not sure yet, Martin, I think some of this loss that we see here is probably not only fluids, but mass, muscle mass tissue. And, again, this has got to be a part of the adaptive process that takes place in weightlessness.

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QUERY Getting back to the exercise, Doctor, I assume you were talking just about the bicycle ergometer exercise and were not cranking in any EVA exercise that you didn't have precise watt-meter numbers on. Can you discuss the more or less sporadic exercise that they get and what effect that might have? I recall, particularly, it seems to me that the Apollo 15 crew did an awful lot of work on the Moon, particularly Dave Scott, wrestling with that drill. And does it have to be a particular kind of exercise, or is just any kind of physical labor beneficial?

HAWKINS Well, the bicycle ergometer is really designed to stress the cardiovascular system, and you really don't get an awful lot of muscular exercise out of it. There's some, but it's not specifically designed as a muscle-building exercise device. It's a cardiovascular conditioning device. And there, I think, is where we really saw the maximum benefit from it. Now, I think the other part of the exercise program does need to direct attention to muscle mass retainment, building it and retaining of the muscle mass itself, its strength. So here you get into the different types, other forms.

QUERY Well, to follow up on that, are you looking at any kind of different exercise programs that might be implemented, if not in Skylab III,then in Skylab IV?

HAWKINS Well, no, to answer your question -

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QUERY - and if not in Skylab III, say, in Skylab IV?

HAWKINS Well, no. To answer your question specifically - No, we have not as yet really turned all of our attention to bear on what type of a new device we ought to be looking at. We've not done that yet.

PAO Arthur, then back to Carolyn Callahan.

QUERY Well, Dr. Hawkins, given this apparent relationship between exercise and the physiological things that you mentioned, where does this leave us as far as the dream of the average man going into space via the space shuttle? The non-scientists and those sorts of people who aren't finely-tuned physical specimens - Are we not limiting this then to space for the astronauts? Where does the general population fit into this?

HAWKINS Well, I don't know where they fit into it yet, Art, really. And that's what we're - that's certainly one of the things we're trying to find out with Skylab, because remember this is the first mission where we really ever had an opportunity to look at man in his totality within this new environment that we're expecting him to live in and work in for extended periods of time. I don't know yet what that answer is. I think, based on what we find, we'll find ways, if we need those people there.

PAO Carolyn.

QUERY Well, I guess my question kind of ties in with that. You thought at one point, Kerwin had reached his adaptive point, and then you say he didn't, apparently. Are you saying that none of them reached that point and leveled off? In 28 days -

HAWKINS No not really, because we saw three different responses, in three different individuals. And, yes, if you look at Pete, you'd say that it looked like he adapted over whatever few hours or days it took, and here again, we were delayed in getting some of these early evaluations in, because of the thermal problems and all that we had to deal with there. But it looked like - You could well say that he was adapted for all intensive purposes through the 28-day period.

QUERY Before he went?

HAWKINS Well, no, not before he went, because he definitely showed differences and changes from his baseline preflight measurement in the 092.

QUERY Can I ask another question about food? Do you have - Have you completed your sampling on the food that was brought back and what does it show?

HAWKINS No, we have not and I can't fill you in with any information on that right at this time.

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QUERY Before the flight there was a great concern about calcium loss and the possibility of - remote possibility of broken bones, have you had any reading on calcium loss?

HAWKINS I do not have any lab data out yet, Morton, and I really don't have any specific data back from Dr. Vogel, who's the PI on the bone mineral scan. His initial evaluation, two days ago, was that there was no appreciable loss seen. Now, he's holding up his final analysis report on that until he's had time to do all his calculations.

PAO Pete Bowman, over here.

QUERY Have you had any interesting subjective impressions from the crew as to what it's like being back, say, the first few days after they were back, as far as awakening, and some of their activities immediately after awakening, walking? Have they mentioned any muscle soreness as a result of getting back to using the old Earth muscles again, things like that?

HAWKINS The - well, all I can talk about are what the initial first 2 or 3 days were until they got back here. I really haven't had a chance to explore any of these things with them, and won't have, really, until we get into the medical debriefing, which is next Tuesday, to get down into some of those type of details again. But, Paul Weitz exhibited the greatest amount of muscle soreness, and joint pain, and this is primarily within the back, some cervical area, low back area, and his knees. The other two didn't really complain about muscle soreness. This is postflight, now. That lasted with Paul over the first 2 to 3 days, with, I guess, perhaps some gradual improvement of it. Interesting enough, this is one of the things which I recall having been commented on by the Russians on their Soyuz 11, 18-day flight. That the crews did experience a lot of muscular ache and pain that persisted for days. But the other two our other two crewmen didn't show anything like this at all. It's just that Paul - They did complain of a feeling of heaviness, that rapidly changed and diminished after being on the deck, during the first day, even. But like one - I forget now which one it was - He said it felt like, well, like one g was like about 2 to 3g to him. And - But this gradually diminished and I think by the next morning, after a good night's sleep and everything, they felt pretty normal.

QUERY Just to make it a bit easier, on me at least, how would you rate their hearts, their stomachs, their muscle tone, as of today, compared with postflight readings?

HAWKINS Oh, man, I'd say they're - I'd say they're back, fully back to normal, with the exception of the - of the - leg measurements, which have not yet returned to pre-flight measurements. They're still about - oh, they're still I think, 2 to 3 centimeters less circumference measurement than what we - we saw preflight. That is not fully returned yet, but - -

QUERY Is that a pooling problem, or a muscle problem?

HAWKINS I think it's a mass - muscle mass tissue.

PAO Okay. Thank you, ladies and gentlemen, Dr. Hawkins. I want to remind everybody about tomorrow's briefing starting at 9 o'clock. Skylab II press conference - the main auditorium.

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SKYLAB NEWS CENTER
Houston, Texas

SL-II Postflight Review - EREP
Johnson Space Center
June 28, 1973
2:09 p.m. CDT

Participants:

Dr. Verl Richard Wilmarth, EREP Program Office
Bob Gordon, PAO

SL-II PC-79A-1
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PAO Okay, ladies and gentlemen, we have Verl Richard Wilmarth of the EREP Program Office here at the center. And we will let him give you an overview of what we learned from the first Skylab mission.

WILMARTH Good evening, or good afternoon, ladies and gentlemen. The thing that we want to do this afternoon is to try and cover the activities, what we learned, how the sensors operated, and what we think we obtained. Unfortunately, we don't have any data to show you this afternoon. It's all being processed, as I think Kenny has already discussed. So it will be sometime next week, I think, before we can have any real data to look at. However, based on crew voice recordings and discussions and looking at our spacecraft data, I think we have a pretty good idea of the kinds of data that we obtained for the 145 principle investigators that we have in the program. On top of the 145, there are some 35 to 40 other scientists that are involved in trying to determine how well the sensors performed, actually doing analysis of the data. Now the 145 PIs, as we speak of them, represent 41 from foreign countries, 104 from the United States. So let's look at what we did for the 145 PIs. May I have the first slide, please? And we will hav copies of the three slides that I'm going to show this afternoon, so you can have copies after the talk. That shows you the 12 or the 11 EREP Z-LV passes. The one, track 49 on the lower left side of Mexico there, is a solar inertial pass that we completed to sense hurricane Ava. In addition, we completed, at the end of the 11th Z-LV pass, a solar inertial pass for a lunar calibration. Lunar calibration was done in order to use the capability, or let's say the physical properties of the Moon, which at near full Moon is a rather unique and constant uniform background, so that we turned all the sensors on as a basic background calibration maneuver. The data will be used in determining how well the sensors operated and also to be able to provide the investigators some basic data for plotting their analysis or changing their programs or enhancement techniques, as the case may be. So let's run through it. We did 11 Z-LV passes in the following order. We started with 20; we ended up with 20. In between 20, we did number 63, which is - you can see. Then we did number 6, then we did number 34. And, after 34, we did number 49, actually the hurricane Ava pass. After 49, we did 19, I beg your pardon, we did 19 right after we did pass 6; we did 19 twice. We did 33, and then we did 48 and 61 over Washington. We did 5, and then we ended up with ground track 20, and then the lunar cal pass. Now what you see here are the actual data-take areas, which we turned the sensors

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on. So, if you'll look at ground track 63, we started off the west coast of California and ended near Mexico city. That block you see there represents the actual areas along which we had the sensors operating. Now, yhere's a matter of timing here. The passes that are the short ones, like 63 and 6 and 34, we operated during the power problem that was on board Skylab, we operated around solar noon. So that if you take about midway on those passes - you take about 10 minutes off of each,side, you can see that we have essentially a 20-minute pass for the shorter arcs that you see on the Vu-graph. The other longer passes, like 48 constituted approximately 30 minutes of data-take time or, in other words, the crew, the spacecraft were operating in a Z-LV mode approximately 30 minutes for the EREP data-take times. What did we get done in the way of consumables? Well, some numbers are rather interesting. We got about 8 miles of magnetic tape, or about 41,000 feet of magnetic tape, along which all the tracks that you see here. We have about 12,800 frames of data imagery from 190A, the multispectral camera system, the Earth terrain camera, and from the DAC camera, which is on board the infrared spectrometer for recording the actual location, the ground location of the data takes for the spectrometers. So, you can see, we collected a lot of data; and, as I said, they are being processed today. I have looked at, very briefly, some of the 190A camera negatives and a very, very small part of what we took, and the pictures do look good. I heard you ask Kenny Kleinknecht how good the data actually are, and I can assure that there are some very interesting features in there, and I'm sure that the PIs are going to be more than happy with it. So, what else did we do, as far as coverage? I think we've got data over 31 states. We collected data over six foreign countries as follows: Mexico, Brazil, Columbia, Venezuela, and part of Bolivia. You can see across ground track 20, you can see where we crossed over Bolivia. Across 48, we crossed over Brazil and Columbia, and on track 5, and on the extension of track 19 and 33. So we did acquire a lot of data for the PIs in those areas. To begin with, each individual PI has a designated task area or task site, as we call them, and it is over those areas that we take, or turn on the sensors and take data. We went back and we tried to determine, based on looking at the postpass weather and looking at the crew voice tapes and things like that, tried to figure out how many of the task sites we crossed over and over which ones we obtained some data. We counted them up. There's about

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186 individual task sites that we collected data over. We turn to the number of PIs who we feel are going to be able to use data. We find that there's about 75 PIs who will be receiving data from the SL-II, and I'm sure this number is going to go up because, as we get all of the film and tape back and we start processing and looking at it from the standpoint of "Did the instruments operate over the individual pass sites," I'm sure we're going to find this number is going to go up. We collected data for only six of the foreign investigators, and there are four in Mexico, one in Bolivia, and one in Venezuela. I'm not sure that we got some data for Dr. Howard over in Colombia, but we're hopeful that we can. Let's turn first to the sensors and see how they operated. We had excellent success. Twelve full successful passes for the 193, the radiometer/scatterometer; and for the 194, the L-band radiometer. The multispectral camera system, 190A, we had one miscue, so we had 11 successful passes. For the 191, actually the infrared spectrometer, we obtained data on all 12 passes for the short wavelength or the visible range of the spectrum; and with sufficient cooling, we got the longer wavelength out into the thermal IR for seven of the 12 passes. On the multispectral scanner, we had nine good passes; we had three marginal passes because we had problems of aligning it - -

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WILMARTH On the multispectral scanner, we certainly had nine good passes, we had three marginal passes, because we had problems with aligning it. After we had completed alignment, we did have very successf l passes. The 190B: We operated it only on seven passes. In other words - that's the Earth terrain camera - We operated it only on seven passes and they were all successful as far as we can tell today. There are some highlights, and we did some rather unique things on SL-II that I think are important to bring out. Kenny, I think, referenced the hurricane Eva, as I have here on the board. Let's talk for a minute about that. Can we have the next slide, please? What we did on a solar inertial pass along ground track 6, with the appropriate help from four principal investigators: Drs. Pierce, Ross, Hollinger, and Moore, from NOAA, from the Air Force, and a lot of internal help here at JSC, we completed for the first time a microwave sensing, radiometer/scatterometer data, of 150 data points across a very major storm. This was done in conjunction and concurrently with the NOAA aircraft and the Air Force aircraft, highly instrumented, that penetrated the eye of the storm. The Air Force did a dropsonde in order to determine the actual pressure levels within the eye. And, incidentally, the crew reported that they could see the blue water through the eye of the storm. At the same time, the NOAA aircraft was using for the first time a laser profolometer, which gives you measurement of the waveheights. They reported 45-foot waves in the center of the storm, also 133-knot winds. So, it's a major storm extending out several hundred miles around. Now, the first space sensing with a microwave system has a major impact if all of the data analyses stand up as everybody at NOAA, and certainly the principal investigators, feel that it will. The reason for the uniqueness is that for the first time the backscatter energy from the radiometer and the scatterometer in conjunction with the understanding of the wind velocities and the wave heights, and the foam density, foam distribution within the waves themselves, the total emissivity of the area, in other words, total reflectivity - If we can measure that successfully with the scatterometer and the radiometer, we will have a very direct measurement of wind velocities and wave heights in a major storm area using the microwave sensing instruments, if they're flown on space or on aircraft, or even unmanned satellites. So it's a rather unique experiment. We are very hopeful that is is going to turn out some interesting results. Now, another one that was very unique in that we overflew the Wabash River area of Indiana, where Dr. Silva of Purdue is the principal investigator, almost concurrently with the ERTS overflight of the same area with their sensors on and the multispectral scanner that they operated. We also flew at 30,000 feet, a high-altitude aircraft, instrumented with a multispectral scanner and the multispectral camera, and also at low altitude, approximately 20 to 15,000 feet, another aircraft, all concurrent, all within the hour of the overflight of ERTS and EREP. At the same time, the investigator had all his teams in the field taking radiometer readings and soil moisture studies and so on and so forth, in order to make it a complete investigation. What this means, people, is that it provided a multispectral and multistage sampling of an area in clear weather, so that we can understand the operation of the instruments at ground at low altitudes, and at high altitudes, with different kinds of spectral instruments operating. So it will provide us a first comparison, real time, of the ERTS and EREP scanner data, as well as the aircraft data. Now, the investigation that Dr. Silva is primarily geared at is land-use analyses, geological studies and related activity. So we did have a rather unique investigation in this area. Those are kind of the highlights of what we've been able to look at from the overall EREP completions and accomplishments on SL-II. To give you a feel for some of the other discipline areas in which we obtained some data: In the field of geology and hydrology or continental water resources, some of the very best data we feel, was obtained over - Can I have back the ground track slide, please? - over western United States and on down into Mexico, where there are some metal exploration, geological mapping, and hydrocarbon analyses studies going on. As far as land-use studies, data over continental United States and on down into Brazil, and Columbia, for broad regional resource inventories, land-use studies, we feel, are going to be - The data were obtained and they're going to be rather useful for these studies. In addition, we did a lot of data collection over the Gulf of Mexico, as you can see there. The ground track 5 crossed directly over Puerto Rico, and based on the post-pass weather predictions and evaluations, the area was clear. Dr. Trumble of the U.S. Geological Survey is going to be very happy, I feel, with the data from the camera and spectral data of the area to look at some of the water depth, as well as Dr. Pulsom from the University of Michigan, some of the bathometric studies, water depth, water color studies, related to the sedimentation of the area around the Puerto Rican platform. Another area that was rather interesting is that if you see Puerto Rico there, right adjacent to it is the very famous, deep Puerto Rican trench. And I forgot the number of how many kilometers deep it is, but it's a major perturbation of the sea floor.

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And we ran the altimeter from the 193 across the area, and we think that we got some very good data for comparison of the relative change in the sea surface elevation, relative to the land areas, and I'm sure that Dr. Shapiro is going to have some interesting data to look at. In the foreign areas, the Mexican investigators are primarily interested in land use, some agricultural studies, some of the geologic mapping and oil exploration programs, as well as looking at the irrigation, continental water-type investigations, planning of irrigation cycles, and understanding the total water runoff of some of their basin areas. In South America, as I stated, they are primarily interested in broad regional resource studies. As you know, the Amazon River Basin is generally a cloud cover area, and I hope that in the number of passes that we had over there, that we got some real good data, although clouds are rather ubiquitious, they're rather all over the areas. I want to comment on ground track 61. We crossed over the Chesapeake Bay-Washington area, and I think if you heard Paul Weitz's discussion with the TV camera through the VTS vehicle tracking system onboard for the 191 infrared spectrometer, you heard him remark that it was hazy and he couldn't really spot Washington or the Potomac. I've briefly looked at some of the 190A data, and I think we do have a good picture of Washington D.C. and the Potomac. We'll have to look at that after there's some more processing. So all in all, I think we've got some very good data for the PIs. I think they're going to be happy, and I think our results are going to have some rather interesting impact on the use of spacecraft data for regional resources and Earth resource surveys. Thank you.

PAO Okay, Arthur.

QUERY Was there one time on one of the passes when one of the astronauts, in effect, kind of forgot to take the lens cap off, or something like that?

PARKER I think you're referring to the - On the 190A, that's the one pass that we didn't get a full use of the camera. There's a green ready light that's always supposed to be open, the green light was on, but apparently it was not. So after that, we did a visual inspection to insure that the door was left - that the door was actually opened during the ZLV pass. I think that's the remark, the - -

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SPEAKER That the door is actually open during a CLV pass I think that's the remark of the situation.

QUERY Dr. Wilmarth on those 3 passes before the alinement of the instruments was worked out is the data usable?

WILMARTH Yes. .art of the data will be usable certainly in the visible and near infrared. We are not at all sure that the thermal channel during those times are actually that the data are actually going to be used for some of the PI thermal studies but we feel that most of the data will be usable in the channels 1 through certainly 7 to me.

QUERY I wonder was the EREP equipment used over any other portions of the world than those you have shown us.

WILMARTH No. No sir, they were not. Those are the actual data take - sensor on and off times of the - for all of the EREP sensors on SL-II.

QUERY (inaudible) are you planning some kind of a conference with them some time in the future to discuss it?

WILMARTH (inaudible) just before I came over here I checked out to see when we are going to have data available for the PIs - that's the last thing I forgot to mention. The screen film for the 190A multispectral scanner - multispectral camera system should be delivered to the PIs for their use by approximately the middle of July. We're planning a 30 day after splashdown type delivery schedule. For the 191 infrared spectrometer 193 and the 194 the mag tapes and related ephemeris data should be delivered by the middle of July also. Now the 190B camera data - Earth trained camera probably is going to take into August before the PIs start getting some of the data. Now the 192 is a little bit different instrument. In order for the PIs to select the channels - whatever channels they want to work on of the 13 and the specific areas within their test site, in other words, cloud free or whatever areas they want to work on. We are going to provide them by about the last week of July a screening film which is actually a tape to film conversion so that they can look at series of channels of the areas that they are interested in and then provide the inputs as to the type of data, mag tapes and everything else that they'll be wanting. So we will certainly be looking at the later part of July, and that is up to the PIs to get their request back to us and then there's going to be some time, probably - maybe a couple of months before they actually get some of their mag tape data to work on. Now that's as we proceed through this system why we'll probably modify that - that's probably an outside number. Now in regards to your question on what are we planning for a PI conference or a PI release of their data, some thought has been given to having a PI preliminary conference sometime this fall but it is a matter of when the data is going to be released and PIs do have to have some time in order to analyze their data, be sure of their results so - it's questionable whether we'll have one this fall but the - next spring - next summer is going to be a major press conference and PI conference for the PIs to present their results and so we can proceed.

QUERY Dick, I'm a little confused over how many foreign countries you've got. You said 6 and then you only named 5. Mexico, Brazil, Columbia, Venezuela and Bolivia.

WILMARTH Oh, I'm sorry, Nicaragua. I forgot one. And I'll repeat them people so you'll have them. Mexico, Brazil, Columbia, Nicaragua, Canada and Bolivia. Dr. Stuart, I think you're going to get some data off of the coast of Vancouver Island. 1, 2, 3, 4, 5, 6. Mexico, Brazil, Columbia, Nicaragua, Canada and Boliva.

SPEAKER Let's begin at the top, can we people, and say that there are 6 foreign countries and they are as follows: Mexico, Brazil, Columbia, Nicaragua, Canada and Bolivia. If I said Venezuela I am mistaken.

QUERY Dr. Wilmarth, I understand that the main purpose from your standpoint was to test these instruments and find out how they would serve and whether they would serve, but at the same time you were also gaining data and trying to use the data. Now we've been told at times that one idea was to get this data available rapidly so that in circumstances like danger of forest fires, like corn blight or other diseases, the investigators or some investigators could actually use this data during the growing season, something like that. Now you're telling us that several months to a year - would you comment on that?

WILMARTH Well, first of all, let's comment on the objectives of EREP. Now EREP was designed as an experiment for 3 general purposes: 1. to determine how useful microwave data are from space in Earth resources. Secondly, is to determine based on the camera and the scanner as well as the microwave systems which ones or which of the spatial spectral bands are of most use for Earth resources survey. And the other one of course is a very important one and that is to determine what are the atmospheric effects on all of the analysis of the data. As you all ready know we do look through the total atmosphere flying at 234 nautical miles. So looking at those 3 objectives I think that the sensor operations and the data we're going to have back from the PI's are going to clearly demonstrate how useful the scanner cameras and the microwave systems are for Earth resources. Now you are correct.

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The data that we are getting back from the PIs and the results will have a direct use - certainly by many regional planners, urban planners, agriculturalists, forest inventory people as a means of getting out a better system for them to acquire their data to do their inventory and do their management planning that goes on with all of these activity. So EREP is going to have two purposes: one, to gain knowledge for use in future system and also as a direct use for the data, now we come to SL-II we certainly have some data that we could fly SL-III over the same - rather typical ground tracks - this is going to be of interest to certainly the agriculturalists as well as forest inventory people to plan some of their activities. Now how useful is going to be dependent upon their own inititive and own ingenuities as to how useful and they want to plan the data. Now I stated that it's going to be approximately 30 days - 30 to 45 days for the PIs to get their data off of the 190A camera. The 190B camera system, certainly the screening film off of the 192 system is going to be available approximately within the same period of time. So the analysis of the data off of those instruments as well as from the 193 and 194 which certainly is going to be within the same period of time, well the analysis is going to be available to us and certainly will be put into reports released through the PIs own organization, technical journals and through the data centers to people who are interested in the results of the EREP analysis. In other words, there's not going to be a restriction on the PIs turning out their data and turning their results into technical reports releasing the data. What I'm saying is that it may be as last as next spring before we have a full scale total review similar to the one that was conducted by the ERTS people last March. So the results will be made available maybe not as a full compendium or a symposium type publication, but the data will be available.

QUERY (inaudible) we cannot look to these instruments anytime soon to give us fast turn around on data we get from space -

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QUERY - instruments any time soon to give us fast turnaround on data we get from space?

WILMARTH I guess the answer is that it will depend upon what kind of a spacecraft, whether an unmanned, or even a high-flying aircraft, how the instruments are used. In other words, if you could put the same instruments into a Sun synchronous orbit over the United States. And looking at the United States on a - on a continuous basis, or even on a - on an 18-day cycle such as ERTS, the data would then be available and the kinds of information that people need on a real-time or a near real-time basis probably could be made available. But, at the present time, you know, all of the data are stored and returned from EREP. So, it's a film return as well as a mag tape return. There have to be modifications to the system to accommodate the real-time data dumps.

QUERY There's something that I'm - not quite understood, and this sort of reminded me of it. Why, in designing the system, would you place it such that Skylab would have to be oriented into this Z-local attitude in order to use it? Why not put it someplace where you would not have to disturb the attitude of the spacecraft in order to use it?

WILMARTH Well, I can't answer that. I do not know why. I do know that EREP was the last series of experiments to be accommodated by Skylab. I think that probably is the answer to the question you're raising as to why you have to go into ZLV. It was put into the area where they could accommodate the control panels and the instruments themselves, and it just so happened that is was in the MDA and it has to be moved in order to be sure that they're all looking vertically at the Earth. That's the only answer that I know of right now.

QUERY What are your plans now for the next mission, and will you have to do a lot of real-time planning as the results of the first mission become known?

WILMARTH SL 3 is going to provide us 26 opportunities I understand, for EREP data-takes. Right now, we are reviewing the - the overall schedule, the plans for the flight planning, and related activities, in order to optimize the times for taking data relative to the PI task sites and to their data requirements. So, in essence, be prepared as we move into flight planning for SL-3, that we have an input on what ground tracks to use and when we take data. As you look at SL-3, most of the early part of SL-3, we're going to have a series of descending passes very similar to what I've shown you on SL-II. Later on into the mission, we will have ascending passes. In other words,

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from the southwest to the northeast across the United States, and over into Europe. We plan to extend the passes within the capability of the system, as we see it today. As on the latter part of SL-2, the 30-minute data-takes will extend on over in to Europe and take our - get some data for our European as well as some of the African PIs. Then hopefully we will be able to accommodate some of the PIs over Japan, Thailand, and Australia. So, it's a matter of planning and trade-offs from what we've learned on SL-2.

QUERY Do you forsee changing your system of weather predicting so that you con't run into so many clouds, and the whole protocol of deciding when you're going to make the passes?

WILMARTH Well, we've talked to the weather people about that - to see if we - (laughter) - to see if we can get better accommodations out of the weather bureau, but that's a pretty tough job, I'm sure you all recognize. Unfortunately, clouds move around pretty fast, and we do have to select the passes based on our weather predictions. I think that - that we looked at the overall forcasting that was done and the post-past verification of the weather, was done very well. But, when you're restricted to descending passes across the United States in June, June is a very bad month, and we are not planning to change anything relative to our weather forecasting that we know of today, for SL-3. We will have some more options, of course, because of the longer data-takes, and, therefore, we will be able to select essentially cloud-free areas to - to sense with our instruments. But, I don't think we're planning anything today on changing the weather predicting and forecasting system. Does that answer your question?

QUERY Could you go a little bit into how flexible you are as far as - as far as - proposals coming in over the transom now that EREP is an accomplished fact? For example, a possible EREP data-take over Africa surfaced toward the latter part of the last mission, and then disappeared almost as rapidly as it had come. And I was a little mystified. The Flight Director at the time explained that they're having a drought in Africa, and bad things were happening, and perhaps the pictures could do some good. What kind of facilities do you have to accommodate quick requests like that, if any?

WILMARTH Well, as you know, the Hurricane Eva pictures and sensing that we did on SL-II was a very similar case. The storm developed - we had requests from the PIs and through NOAA to accommodate such a an EREP pass. And the system was worked so that we did accommodate that and I think the results are going to be very gratifying. As far as taking on additional tasks, the system is that flexible to accommodate these things. And I think the case that you reference is pretty late in the mission. And the matter of getting all of the tasks done in order to - for reentry, and setting up house-keeping for the next crew, just prohibited any other additional time for the crew to operate any of the - the EREP instruments. But the system is that flexible. We can accommodate these kinds of tasks and I'm sure that - that's why I referenced to Africa on SL-III. We have some passes directly over Molly, and that area, where the drought is pretty severe. And that's going to be - certainly one of the considerations as we go into our pass planning.

QUERY Is that - is there any chance you'll be doing some EREP passes over the Soviet Union or China?

WILMARTH No, we do not plan any. As a matter of fact, our sensors are turned on only over the areas where we have approved investigations, or the designated task sites, and we don't plan - we don't have any investigators in these areas.

QUERY What's the last possible time you can make your decision before you make a pass? How many days elapse between you say we're going to go - we're going to take this pass, or we're not?

WILMARTH Our planning cycle is approximately - has a mean time of two days. In other words, we do a pass selection. Say one evening - we go - we do a - an evaluation 1, which is one day prior to the pass. In other words, we do that at approximately - oh, six - seven o'clock at night for the execute day tomorrow. In other words, one day away from the execute. And that's a GO or NO GO. We do the the pads - in other words, the directions for the crew for turning on instruments and types of films and film - filter settings and things like that. So, by 11 o'clock that night, the pads are generated and uplinked to the crew. So that when they get up in the morning for an early morning pass, they have the data available for an EREP pass that day. So that's the kind of timing sequence that we do.

QUERY Do you plan to go over some of the same sites that you went over on SL-2?

WILMARTH Yes. Because some of the PIs have requirements for data-takes on SL-2, 3, and 4. So we will be overflying and, hopefully, we're going to overfly Houston this time so we can get some data for the - our own PIs here. Yes, we will be doing that.

QUERY Well, if the clouds move in between - -

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WILMARTH Yes, we will be doing that.

PAO Carol, one more?

QUERY Wall, if the clouds move in between 11 o'clock at night, when you send up the request for the plan, and the next morning, are you stuck with it?

WILMARTH No, we can always postpone a pass. We can always scrub a pass. In other words, we can scrub a pass at 6 o'clock that following morning, or 3 hours prior to data-take time. Yes, we're not stuck with that; we can do that.

PAO Okay, ladies and gentlemen, thank you. Take one more?

SPEAKER I have a couple of announcements here. As we said earlier, Dr. Hawkins is running late. He is still in the flight readiness review for Skylab-III, and we don't expect him to be here, no earlier than 4 o'clock. However, if all you visiting firemen please check with Judie, who is in charge of our coffee greens, there is something for you planned for tomorrow evening, all the visiting troups, okay?

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SKYLAB NEWS CENTER
Houston, Texas

SL-II Postflight Review - Summary
Johnson Space Center
June 28, 1973
1:08 p. m. CDT

PARTICIPANTS:

Kenneth S. Kleinknecht, Manager, Skylab Program Office
Dr. Robert Parker, Chief Scientist, Skylab Program
Bob Gordon, PAO

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PAO Okay, good afternoon ladies and gentlemen. To many of you I'm sure Mr. Kleinknecht needs no introduction, Kenneth S. Kleinknecht, Manager of the Skylab Program Office at the Johnson Space Center, and Dr. Robert Parker, Chief Scientist for the Skylab Program. We'll start off with Mr. Kleinknecht giving a brief summary along with Dr. Parker, and then we'll throw it open for questions and answers. Mr. Kleinknecht.

KLEINKNECHT Good afternoon. I guess the significant things that we know now that we didn't know last Friday at landing is the crew is back here, and they have continued to adapt to 1g. We have all of the data back here now, and it is being processed. We've seen samples of all of the data that we collected on Skylab I, II. We do believe that we have valid data, and have no reason to believe that all of the things that we had previously said we accomplished in flight are not going to give us creditable scientific data for analysis by scientists. The workshop, unmanned, is continuing to operate and be stable. We have at this time no constraints that we know of that would preclude us from flying Skylab III. And the present launch date is about 90 percent probable it will be on the 28th of July now. It would be a launch at 7:00 a.m. eastern daylight time, and I don't know the exact day for end of mission, but the end of mission should be about 4:30 in the afternoon, local landing time. It will be a descending pass off the west coast of the United States or about where SL II was. We have talked to the crews and the crew reports that they got no significant surprises in flight. They have not given us in the crew debriefings to date any significant concern that says we have to make any major modifications in our plans for future Skylab missions. I think as you know, we start next week through next week and into the Wednesday of the following week, I think we have the detailed systems debriefings. We have obtained from dump voice tapes significant amount of information of little detailed problems that the crew had. And we have in process now some hardware such a restraint straps to carry up on Skylab III that will bette restrain the crew and the body mass measuring device in the waste management area and on the ergometer, and on the rotating litter chair. We also have plans to replenish some of the film, some of the drugs and so forth that were degraded because of excessive heat. Again let me say that we have looked at some of all of the data. We're particularly well pleased wih the data that we're getting out of EREP. As you know, that will all be released to the PIs, and placeo

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in the public domain in the future, and will be accessible. Everyone will have access to it. Although I don't think Bean [?] counts for a good way to measure the success of a mission, I do have a slide here that I want to show you that does give - based on hours and percentage numbers of what we accomplished against the premission flight plan. Let me say though, like we have told you all earlier, before the SL I, II mission that we had a crammed-full flight plan. We didn't expect to do everything. We purposely made it that way so that we could better handle real-time flight planning. And we, did if something didn't work right, we were prepared then to slip something else in its place. Can I have the first slide please. Our total hours completed are as you see here - I think Jack King will have - Jack King will have a copy of this. The preflight totals we show here, so we got 80 percent, 91 percent, 90 percent, 96, 80 for an average of 89. The significant loss was in the EREP, when we had the - -

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KLEINKNECHT - significant loss was in the EREP when we had the power problem. We had short data passes. And that's why we did not get as many sites as we might have. But this low percentage was not as a result of hardware performance. Now, I'd like - let me have the next slide. I'd like to take - look at it a little differently. The initial flight plan added up to 28 days. We planned 2-1/2 days for launch, docking, and activation. It took 3-1/2 because of the standup EVA. We planned nothing for standup EVA or for parasol deployment so that's this 3-1/2 that's included here. We planned 20 days of experiment operations and we did do 20 days of experiment operations. So if you want to say - base success on numbers, you can say we did exactly what we planned to do. We planned 3 days off at the crew's option and at their suggestion, they only took 2 days off. So that helped make up for some of this. We did do the SAS panel deployment; took 1-1/2 days and we only took about 2 days for deactivation as against the original plan of 2-1/2 days. That, too, then, indicates that the systems are working as the crew planned and that indeed by the end of the mission, they could do more work in a given period of time than we had planned on, because they had a significant different storage problem to stow and deactivate the workshop as well as the items that we returned on the command module. Let's see the next slide please. The overall mission results: we accomplished the intent of all 48 experiments that were operated on SL-I, II, Skylab I really. Six earth resources sensors, 15 medical experiments, 5 ATMs, 17 scientific and technological, and 5 students. We did, as you're aware, delete S020, T025, NT025, because they were to be used at the scientific airlock - the solar scientific airlock. We did not have that available. We deleted S015, zero gravity human cell, because of weight and power consumption; 555 crystal growth for the same purpose, weight and power; 509 we did not operate because of concern with the batteries having been overheated. We have subsequently, done a full analysis of those batteries and we have no concern about the batteries that are up there now. We will do that on SL-III and IV and we deleted three student experiments. Now all of these, S020 and T025, we now have plans, we have hardware - flight hardware being built to carry up so that those two experiments can be done during an EVA. We'll mount them out on a - part of the ATM truss during an EVA and we'll collect that information. However, they will not be done on SL-III, they will be done on SL-IV. Our approach to SL-III storage has been to fill within the payload capability - our approach to SL-III is to fill the spacecraft within its payload - within the launch vehicle payload capability and the constraints

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established by CSM structural loadings and volume. Even though some of the hardware we will not be able to use on SL-III. In this way, we will try to correct and provide for doing the things that we know of now and retain some flexibility to take care of maybe some more contingencies on SL-IV. S015 was a 26-day - 28-day experiment. It is being slightly modified to make it a 56-day experiment and it will be installed in the command module for SL-III. 555 - M555 crystal growth will be carried up and will be done on SL-III as planned on SL-II. Skylab 1 - I keep saying SL-II - Skylab 1 is the mission we flew. We talked about the 509 astronaut maneuvering equipment and we will make up the student experiments. May I have the next chart please. Overall mission results - -

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KLEINKNECHT Could I have the next chart, please. Overall mission results - Crew was healthy throughout the flight as you all well know. Dr. Hawkins later will talk about the crews' return to their 1-g baseline and their progress in that respect. We did gain a significant amount of experience in space station operations. I think it's quite significant that we flew a major manned space station for the first time. The training was outstanding. The crew has commented that - as I said earlier - they had no surprises. We can fly a vehicle for the first time and it can operate as we expected after you take care of a few early problems. The adequacy of the basic systems has been demonstrated. The habitability has been good. Food is good. Sleeping quarters were good. The crew's ability to maneuver and do work in space was fully demonstrated and there were no problems there. They also remarked that they were very happy to get their weekly shower whether they needed it or not. I guess in summary again - overall we learned many lessons that are applicable for the next mission. We also have confirmed that we can identify now no constraints on continuing the program - in completing the Skylab program as initially planned. We did show that we can handle much more data than we've ever handled before in real time, although we have some improvement left there to process some of this data a little more rapidly for - in real time. And certainly it's been obvious that we can do real-time flight planning. Let me have the next chart, then the last. We did get some unexpected returns. I think as you have all been exposed to before, we've demonstrated man's capability to perform in space, to do sometimes the unexpected and to, in fact, do things that could not have been done without man in space. We had, although this isn't exactly an unplanned result, I guess it was fortunate that we had a hurricane during an EREP pass. And it's always been a part of the program to get short-term phenomena during our flights, whether it be other science data as in the solar experiments or EREP. So, overall, I would say we had another unparalleled success in Skylab. We've had them before. And the lessons learned certainly overshadow any numerical results that we made place on the mission. That's all I have for a program summary. I guess we can open to questions.

PARKER I'd just like to say a couple of brief words and that is that one - some of the experiment people will be coming in to give you individual briefings on EREP and ATM and so forth. And I think that, rather than steal the major part of their thunder for what results that we do have, that I ought to caution you they are pretty meager so far. Film is just being developed. I was in Washington yesterday and one of the ATM PI's was estatic. They had finally developed

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one strip of film and they indeed had good results on it. And he could see things beginning to come in probably today. You know there isn't a tremendous flood of results and answers to give you but I know the EREP people have developed some or all of their film and they will at least be able to tell you something, again, perhaps only, about the quality of the film. And you know whether it looks like we got good data and we'll be able to do something with it. Let me leave those particular aspects of the sciences to the people who come in to talk about the science ones, because that's their whole game. That's all they have to talk about. And other than that I guess all I really would like to say again is to emphasize that what we've done so far in really setting out and attempting and I think to a large degree meeting the objectives that we had - at least the objectives that we've reasonably expected to meet - we cannot claim that we did everything we set out to do. Number 1, we didn't expect to; and number 2, we didn't, which makes it true in two ways. Besides that, though, we did I feel accomplish significant steps along the road in the direction of achieving what we set out to do. And as Mr. Kleinknecht said we achieved the basic intent of all the experiments that we sent up. The data I believe is showing what's come out. I prefer to have them speak to it directly - just showing that the knowledge - we spent the time and put the effort through to do it, but coming up to say yeah we did get the data, we'll be able to do something with it in the end. I think that's about all I'd like to say, except to answer the questions.

QUERY Mr. Kleinknecht, what is the basic reason for the change to the 28th launch date and so what is the splashdown date? You gave us the time of splashdown but not the date.

KLEINKNECHT Well, I don't have the days counted. It's 56 days and I don't know whether we get mixed up and whether you count the first day, day zero or what, but it's 56 days. There is no change in the launch date. 22nd - that's the one I had counted to - that's the 22nd. There is no change in the launch date. We had said that it would be day 28 plus or minus 1. We would have to wait until we observed the trajectory of the vehicle in its current configuration after the CSM returned, or left it. We had planned for the 27th to be the earliest date and it turns out now and I say 90 percent probability - they wouldn't give me a firm figure yesterday - they said they'd have it by Friday - that it will be the 28th and that is selected so that we get an M = 5 rendezvous.

QUERY You made two references which I noted; one was that I think you said the crew had no surprises and the other one was toward the end of your comments, you said

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there was a unparalleled success. In the first remark - the crew had no surprises - I'm not sure I understand what you meant by that, because surely they did have some surprises.

KLEINKNECHT I meant in the basic systems and the way the operated - maybe I should have qualified. I should have - Well, I don't have to qualify that because they didn't get a surprise. They knew that SAS beam wasn't out. They knew we were hot when we went up there. So all the things they did, we had planned to do prior to the mission. And I'm saying that the equipment operated as had been advertised to the crew. And they didn't have any difficulty because of poor simulators or lack of training and they were able to do all that they set out to do.

QUERY You didn't plan for the refrigeration to go out or the cooling loop when you had to wake up the crew, and so forth, and some of those other things, did you? That's what I'm getting confused on your comment.

KLEINKNECHT Well, I consider a surprise as something significant. If you go to bed at night and you're air conditioner goes off and you get warm and wake up - do you consider that a significant failure or surprise?

QUERY If I were in an orbit 280 miles around the Earth I might, but the other part about was you called it an unparalleled success. You said you got 61 percent of EREP.

KLEINKNECHT I did not say I got 61 percent of EREP. I said I devoted 60 percent of the hours that I had initially had in the Flight Plan. I had prefaced that by saying that we had more in the Flight Plan than we thought we could do when we started out. Now when you talk EREP too you have to consider weather. We could have gotten 100 percent of the passes and had everything covered by clouds and we'd have gotten no results. We did get a lot of data because there was not a lot of cloud cover. And EREP is a program for the total program - we believe that we're going to get all of the sites and all of the data we set out to do in the program.

QUERY Dr. Kleinknecht you said the crew had just a little problems that you're going to correct on the next flight - body restraints, waste management - could you go into some detail on those, please?

KLEINKNECHT Well, they commented that we put in relatively late, although it wasn't just before the mission - we put in a seat or restraint at the ATM console and it had more like an airline seatbelt on it. It had a buckle and an arrangement that you just pulled up tight. The ergometer - we had a wide belt that went around the waist and we tried to tie it down to the ergometer. We believed that would work from zero - from 1-g testing - it turned out that it did not constrain them properly in the seat -

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KLEINKNECHT - it turned out that it did not constrain them properly in the seat. The body mass measuring device - we had straps and it appears that the crew was able to move a little bit in that device, and if you move in it you don't get an accurate weighing. On the commode, we had a device that had velcro on it, and they just couldn't tighten that up and hold themselves firm. So we now have some belts that we plan to carry up that will snap on and be more like the air-line belts. They can pull themselves down snug. We also had a velcro strap in the waste - four of them - in the waste management compartment that didn't fit well over the triangle shoes. We are modifying them. We had problems with the safety razor. It didn't clean out like it does when you squirt the water on it on the ground, so we're sending, instead of expecting to use the single blades several times, we'll send up a blade for every shave. We also have a wind-up mechanical razor. The crew reported that they used a lot of tape for taping things. They used a lot of rubber bands. Some of the restraints for the data files didn't work exactly as we would have liked them to work, so we're making some minor modifications to that. They reported that they never had too many bungees, or the type restraints that you can stretch and put over something to hold it in place. We're providing more of those.

PAO Roy Neal.

QUERY Kind of wonder if you could elaborate a little more on the health or the condition of Skylab as it is now. I'm looking now at such things as the refrigerator. What are you going to do about the shade with the next crew when they go up? What sort of temperatures are you maintaining inside the spacecraft, that kind of thing?

KLEINKNECHT Temperatures inside the spacecraft, I believe, are about 100 degrees now, Roy. And they went up with the high Beta angle when we were in the Sun all the time. We did not have the fans operating so you would expect them to get warmer. They have started down now. The refrigerator temperature is above zero degrees now. That's well within our limits - desired limits of zero plus or minus 100. The parasol that we have up there is effective now. From the photograph - flyaround photograph - it's difficult to make a color comparison because of the way the light reflects off of it. From the crew's description, we believe that it is probably not as degraded as we thought it might have been from some of the testing that we did on the ground with simulated Suns. The current plan is to, sometime during SL-III, deploy the twin-pole sunshade. However, we are building another parasol, and we will carry another parasol up. I believe that we may reassess this

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plun to deploy the twin-pole sunshade between now and the time the crew arrives, or maybe even afterwards, although that is not in the plan now. Program plan is to cover it up with a twin-pole shade. There's, I guess, two aspects of that. One is, if you put up another parasol, you would have to jettison the present parasol. There will be some time when the vehicle is unprotected from heating. The temperature rise rate is something 4 degrees a minute on the outside skin - that doesn't mean it rises inside that rapidly. Certainly there's some risk in another parasol, although I think it's very very low. We've made some detailed modifications to the parasol since we had more than a week to work on it. I believe it is significantly more reliable than it was the first time, even though it worked the first time. The parasol, you can modulate, as we did do, and looks like we overmodulated it. With the twin-pole sunshade, when you put that out, under some conditions, you may require more power because you might get too cold. If you put that out, there is a possibility to modulate that by going EVA again, and pulling your clotheslines back and uncovering a portion of the vehicle. But you're then committed. If there should be any degradation of that, you need another EVA to replace it, and that might be a hairy job to go out and take that thing down. I don't know - we haven't trained on that.

PAO Arthur Hill.

QUERY Kenny, I wonder if you could go into the reasoning behind planning to do more than you know that you're going to be able to do. Because if you look at that on the surface of it, one might think then that you are setting yourself up so that you can more easily claim a success on a flight by carrying that approach. And then after that, also like some operational explanation as to what the EVA plans look like now, as far as where they're going to fall into the Flight Plan for SL-III.

KLEINKNECHT Well, you'll just have to believe me, Art, that we did not have that in mind when we planned more than we thought we could do. Personally, I feel like many more things worked better than I expected them to work. We had more planned in event we had a failure of some experiment that couldn't work - wouldn't work. We then had something that could be used as a filler. And you have to train for all of these things, and you have to write all the procedures, and you have to figure out how you work them into the Flight Plan. I think we would have been very remiss if we only planned to do half of what we thought we could do and then got up there aand had a lot of spare time on our hands and didn't know what to do with it. With respect to the EVA, there's three EVAs and I don't know what day they are. They are very early. As soon as we can, we go out and we take some film out of the ATM, we replace some cameras and film. In the middle of the mission we do it again, and again at the end of the mission, about the same time as we did in SL - Skylab 1.

PAO Bruce Hicks.

QUERY A couple first for Bob. From what you've been told or seen yourself of the data, would you say you're generally pleased, or do you think really - really have got all that much good data, or you've just seen some of the good stuff.

PARKER What we've seen so far, which is really not good stuff, but first stuff, which may or may not be good. (garble) - what comes out in the next four days might just turn out to be disastrous, but since you didn't select the stuff you started out with, with that in mind, what we've seen so far we are quite pleased with.

QUERY A couple quick ones for Ken. First of all, two of your charts differed on student experiments. One of them showed five planned and four accomplished, and one of your last slides showed five accomplished. And that was the one where you also showed what was going to be deleted. And that doesn't make sense to me.

KLEINKNECHT No, it says - it said we compiled it -

SPEAKER That's hours.

KLEINKNECHT That's hours. First one was hours, and the last one was what we completed.

PAO (garble) one more.

QUERY And one other - I noticed all your slides are Skylab 1, and you even made reference to it. When, or if, is NASA going to get that straight. What are they going to call it?

KLEINKNECHT Let's just call it Skylab. I don't think NASA's going to change anything.

PAO Bill Shelton.

QUERY The eternal question that people always ask newsmen, just as they ask you, has to do with the benefits to man here on Earth from this mission. Now Skylab has been widely touted as being one of the first missions to really create these benefits. What you've given is a kind of administrative overview of the accomplishments. Now if you were asked, let's say a Congressman asked you, now what can you say now have benefited man on Earth from this mission. What would you reply to him?

KLEINKNECHT I would reply, as of today, nothing more than the technology that has been developed, but I believe that man will benefit from now on from that technology, from

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the applications of the data that we've collected in Earth Resources for land use, mapping, for resources management, for understanding the Sun, and where all our energy comes from, and from things like manufacturing in space. And really the challenge and the burden is now on the Government and the industrial community to apply this information and use it for man. And we in the Government cannot go say, this is the way to manufacture in space - -

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KLEINKNECHT - - of the government and the industrial community to apply this information and use it for man. We in the government cannot go say, this is the way to manufacture in space, and this is what will be good for you, the industry. We cannot go take over the resources management of the nation or the world. We have, I believe, we will have shown by using this data, you can better manage the resources and ecology of the world. We have some experiments, some of the EREP experiments could only be operated by man. However, the techniques for collecting the data, I believe, will have been established, and they will be applied to the next generation of unmanned satellites, like ERTS, which then would be a continuous benefit to the man on the Earth, on the ground. And I think we can all recognize that the ecological balances of the world is in jeopardy, and anything we can do towards alleviating that situation certainly the man on the street should be able to understand.

QUERY NASA's investigation or study into what went wrong now stand?

KLEINKNECHT The accident investigation, investigating board is in session now there at Marshall. I don't know when that investagation will be completed, but I would expect that it would be in the next, say by the time we fly SL III.

QUERY Have the names of those appointed been released?

KLEINKNECHT Yes, they have, I don't have them in front of me. Bruce London of Lewis Research Laboratory is the Chairman of that group. And it is a small group. They are investigating only that incident, not the program.

PAO Nick Krissen, down on front.

QUERY Was there any degradation at all in the frozen food when that refrigeration system before it stabilized? And also, second part, do I understand correctly that refrigeration is now back in working order okay?

SPEAKER Yes. There was some degradation, very little. It wasn't any to be concerned about. I don't remember the exact numbers. We had - I don't know, we can get the numbers, but we had a temperature that they could go to for 24 hours, and a temperature that they could go to for 28 days and with some acceptable degradation. And the degradation in the food was for the benefits for the - we were concerned about for the benefit of the experiments, not for the benefit, not from the standpoint of nutritional value. The crew could have still lived off of it and eaten. But I believe we had no degradation in the experiment results because of the food temperature getting, coming up a little bit.

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PAO John Willhow.

QUERY Ken, two questions. One, is the next prime crew practicing in Huntsville in the water facility on establishing the two pole?

KLEINKNECHT They were down there last weekend. And I don't know whether they have or they are going to train. They will train on that. I believe they have done it.

QUERY And the other question, you said that some of the techniques worked out in EREP, would enable better design of future unmanned EREP packages. Could you be specific on that?

KLEINKNECHT The S192 multispectral scanner has a thermal channel on it that we've never flown. We've never flown the thermal channel before, ERTS had that. I believe now that did work, although there hasn't been analysis of that data. And that's very - well I'm not a scientist, maybe ought to let Bob talk about it, that does give some very needed data.

PARKER Yeah, that's really in a large way, when Dick Wilmarth comes in here, you can get some specifics from him. I'm sure he would very much want to talk about that. He's sneaking in the door there. But EREP was very much a test bed for an ERTS II sort of thing as it were. And we may discover from this that there are some (garble) and some investigations that need to be carried out by man. We don't really see how we can do this unmanned. There are others that as it turns out that we can - you know as I said before, flying EREP as a manned mission the first time around, gives us a tremendous amount of flexibility as far as flying it as a test mission, then putting it up in an ERTS. If we had flown a second ERTS right now, and flown with some of the Skylab instruments then you see, those things that needed modification during the mission or needed to have a whole series of matrices, of tests flown on them, were tremendously complicated in an unmanned experiment. Where there is a man up there, you can take advantage of his flexability, the man's flexibility to make this a reasonably widespread test matrix, and then we can work from there. When we see those results, some of them will say, hey, that this particular application is most applicable to - can well be done now we think on unmanned, and this one perhaps needs a man around to tend it all the time. So that's one of the things we're looking beyond EREP to either an ERTS II or an EREP too as you like.

QUERY Ken, since someone brought up the accident board, can you tell us why with the first launch and perhaps the only launch of this expensive vehicle, the

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Skylab workshop, there was no NASA photo requirement at launch, and indeed an Air Force photo recon plane was scheduled to fly the next day, and the manned launch was stayed on the ground at Patrick?

SPEAKER I can't answer that. We did, I think we did have photo requirements, we didn't have mandatory requirements. We didn't consider that they were mandatory, the launch vehicles had flown before, and I think we were more interested in getting into orbit than getting pretty photographs. I don't know we'd have got a photograph - we'd have known any more than we know now if we had photographs. Of course that is in retrospect, I certainly couldn't say that before the mission.

QUERY The amazing thing to me and I'm sure the other people, was the persistance shown in face of very great odds, and at many times. Was there any, did it ever occurr to you, or the crew or the support that it was time to pack up and go home?

SPEAKER I don't think it occurred to any member of the Skylab team that we were approaching that time. We have as you well know and we have said before and I think you observed, we have a dedicated team, industry, the government, the Universities. And the best way to get something jumped on is to take a positive can do attitude. And I think that is what we exhibited, and it paid off well.

QUERY Aside from the equipment that you'll be taking up to - aside from the equipment you'll be taking up to be able to perform two experiments on later mission, are you taking up any other repair items or tools or modules, or things like that you might need or anything else?

SPEAKER Oh yes. We broke a rachet wrench came apart, and we're taking up another ratchet wrench. Some of the personal hygiene kit toothpaste leaked and was all over everything, we're replacing that. The shoes wore out in the toes, they apparently used toes to guide and steady yourself more than the triangular shoes, the toes of the shoes wore out. We're taking up 12 pairs of soft shoes with material over the toes. Well, in fact, they are made out of the material similar to the EVA over gloves that has more abrasion resistance. We're taking up some covers for the triangular shoes so that they will be more abrasion resistant. We're taking up 2 spare tape recorders. We've had a tape recorder failure in the workshop, we're taking up 2 spare tape recorders. We're taking up 2 TV cameras. I don't have the whole list in front of me. Some of the drugs were degraded from temperature, we're replacing those We

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are considering taking up a heat exchanger. If you recall, there was some concern of the heat exchanger control valve sticking. If that should stick during an EVA when you had a high heat load on the system, the radiators would freeze up. We're designing a heat exchanger, and we haven't commited to take that up yet, but can be taken up plugged in so if that valve should stick in that position we can keep a heat load on the system to keep the radiator from freezing.

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SPEAKER - - should stick in that position. We can keep a heat load on the system to keep the radiator from freezing. It would take another S082A camera for the one that failed. We're taking up some extra film to do more S019 and S183 - that's a good cross section.

QUERY I had heard somewhere that some consideration was being given or some research was being done on the possibility of making another solar wing that would be deployed out of, I believe the radial docking port.

SPEAKER We had been working on such a device since the first of June. And that concept was to take two solar array panels off of the backup ATM to fold them and put them in the S1B on the structure similar to - or the structure that holds the SLA together and similar to what the LM was mounted on - it would have a tubular section with two docking ports on it, we'd have separated, turned around, docked with it, extracted, went around and docked to the radial docking. It would have had 8 or 9 CBRMs, would have had an instrumentation system on it and would have had a control panel as a part of that. We could have done the whole operation without going EVA. And it would give us effective - another thousand watts. Indications are today that we're going to terminate that activity because it doesn't look like we need more power. As a matter of fact the power situation continues to get better. We had 6 CBRMs as a result of being overheated, we're down to about 10 amp hours capacity which is about 50 percent of their original capacity. They have recovered to about 15 amp hours capacity now and we expect them to continue to improve a little bit. With the famous hammer - we fixed one CBRM - that gave us another 200 - 250 watts. Well, all those things are - and we deployed the SAS wing - so all those things are deltas us in a good direction subsequent to the time we started this SAM - we called it SAM - solar array module.

QUERY Has the second Skylab crew said anything or indicated what they have learned from the first crew or from watching them, talking to them, things that they can apply on their flight that they didn't know before?

SPEAKER I don't quite understand your question. There is - Sunday evening and all day Monday, the SL-II crew will talk to the SL-III crew to exchange ideas and go through the lg trainers. I don't know what you mean by have they learned anything from Washington.

QUERY No, I'm sorry, watching them. That is, you know, anythin that they just - you know, just watching the flight -

SPEAKER I'm sure they've learned something. They have reviewed all of the TV activities but I don't have a measure of that or I haven't heard any comments on what they learned.

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QUERY Did they actually wear out several pairs of shoes? How many and exactly how - why did this happen?

SPEAKER We haven't had the detailed systems debriefing and I don't know whether they were completely worn out. They were frayed - whether they continued to use them or not, I don't know. We did have enough shoes up there we thought for the entire program. We believe by replacing this 12 pair of soft shoes and I don't know how many of these toe covers we're taking up but it will be enough for the balance of the mission.

QUERY What sort of fraying?

SPEAKER (Garble) walk on shoes, not drag your toes around and it looks like they dragged their toes and used their toes by sticking them down in the grid instead of taking the time to use the triangle shoes - it was so easy to just steady yourself with a finger or a toe - just a lot easier to work in the space that we expected in a large volume.

QUERY Do you know approximately - no matter how gross the estimate the cost was to NASA as result of this meteoroid shield shattering on launch? I mean all the repairs that were -

SPEAKER We think we spent about $100,000 here at this center because of that. Now we had a lot of people that were working - would have been other wise working that we had them work on that instead of what they would have been doing.

SPEAKER Let me correct that. It's about $250,000. It was about $100,000 for training SL-II and SL-III crew as a result of the instrument.

QUERY Two questions. I wonder if you have made a determination on the material that will be used in the parasol that you're going to take up?

SPEAKER Yes, we have. It's made by Schjeldahl in Minnesota. It is Kapton, nylon and the Kapton gold surface will be out. Kapton/nylon - a little different weave than we previously used and there will be vacuum deposited aluminum on the nylon. So it'll be turned over from the orientation we now have. It's lighter, it packs very nicely in the canister.

QUERY One philosophical type question; do foresee a role for women in space in the immediate future?

SPEAKER Not in the immediate future. I don't think we have time to train - select and train any women for Skylab, and I look to that as the immediate future. ASTP - the crews are selected so I don't think they fit into that and Shuttle I think if you look at the Shuttle as immediate future - I think quite likely women observers or scientists could fly in Shuttle.

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QUERY Ken, is that $250,000 cost, you said for just this Center - or does that include all the Centers?

KLEINKNECHT That's this Center.

QUERY And you'd have a figure for all the Centers, like the Marshall work and down at the Cape and so on?

KLEINKNECHT I don't have that. (garble) at the Cape?

KLEINKNECHT The Cape spent very little. In fact in the long run - in the long run I believe that we'll wind up spending less money on the program because of this. We've accelerated the SL-II or SL-III launch - that allows you to get rid of some man power earlier and although the SL-IV launch date has not been selected, I expect that we may accelerate that too and belive that the kind of money you spend by accelerating is primarily overtime and that is much less than the money it costs you to run a program out. However, there is, as you probably know, some science interest in observing the comet that's going to be available towards the end of the year. And that's another subject as to whether we are up there to observe that.

QUERY Didn't someone put up the figure $1,000,000 a day because of the delay due to the accident aboard the Skylab?

KLEINKNECHT I think they put out a figure that we are spending about $1,000,000 a day in the total program and that isn't because of the accident. That's what we are spending in the program. That's how many people we have working on the program and whether you fly or not you're spending that. The cost comes at the end. If because of that you stretch the program out a month, you can say maybe that $30,000,000, but we don't plan on doing that. As a matter of fact we've recovered two weeks by accelerating this launch. Is it 2 weeks or 4, two weeks I guess over what the program looked like on the 15th of May, by accelerating SL-III.

PAO Ladies and gentlemen, is that it? Thank you Mr. Kleinknecht, Dr. Parker. We have a slight change in our schedule for this afternoon. Dr. Hawkins is still involved in the FRR - Flight Readiness Review for Skylab III so the next presentation will be by Dick Wilmarth on EREP. Dr. Hawkins will follow Mr. Wilmarth.

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SKYLAB NEWS CENTER
Houston, Texas

SL-II Postflight Review - EREP
Johnson Space Center
June 28, 1973
2:09 p.m. CDT

Participants:

Dr. Verl Richard Wilmarth, EREP Program Office
Bob Gordon, PAO

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PAO Okay, ladies and gentlemen, we have Verl Richard Wilmarth of the EREP Program Office here at the center. And we will let him give you an overview of what we learned from the first Skylab mission.

WILMARTH Good evening, or good afternoon, ladies and gentlemen. The thing that we want to do this afternoon is to try and cover the activities,what we learned, how the sensors operated, and what we think we obtained. Unfortunately, we don't have any data to show you this afternoon. It's all being processed, as I think Kenny has already discussed. So it will be sometime next week, I think, before we can have any real data to look at. However, based on crew voice recordings and discussions and looking at our spacecraft data, I think we have a pretty good idea of the kinds of data that we obtained for the 145 principle investigators that we have in the program. On top of the 145, there are some 35 to 40 other scientists that are involved in trying to determine how well the sensors performed, actually doing analysis of the data. Now the 145 PIs, as we speak of them, represent 41 from foreign countries, 104 from the United States. So let's look at what we did for the 145 PIs. May I have the first slide, please? And we will have copies of the three slides that I'm going to show this afternoon, so you can have copies after the talk. That shows you the 12 or the 11 EREP Z-LV passes. The one, track 49 on the lower left side of Mexico there, is a solar inertial pass that we completed to sense hurricane Ava. In addition, we completed, at the end of the 11th Z-LV pass, a solar inertial pass for a lunar calibration. Lunar calibration was done in order to use the capability, or let's say the physical properties of the Moon, which at near full Moon is a rather unique and constant uniform background, so that we turned all the sensors on as a basic background calibration maneuver. The data will be used in determining how well the sensors operated and also to be able to provide the investigators some basic data for plotting their analysis or changing their programs or enhancement techniques, as the case may be. So let's run through it. We did 11 Z-LV passes in the following order. We started with 20; we ended up with 20. In between 20, we did number 63, which is - you can see. Then we did number 6, then we did number 34. And, after 34, we did number 49, actually the hurricane Ava pass. After 49, we did 19, I beg your pardon, we did 19 right after we did pass 6; we did 19 twice. We did 33, and then we did 48 and 61 over Washington. We did 5, and then we ended up with ground track 20, and then the lunar cal pass. Now what you see here are the actual data-take areas, which we turned the sensors

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on. So, if you'll look at ground track 63, we started off the west coast of California and ended near Mexico city. That black you see there represents the actual areas along which we had the sensors operating. Now, yhere's a matter of timing here. The passes that are the short ones, like 63 and 6 and 34, we operated during the power problem that was on board Skylab, we operated around solar noon. So that if you take about midway on those passes - you take about 10 minutes off of each side, you can see that we have essentially a 20-minute pass for the shorter arcs that you see on the Vu-graph. The other longer passes, like 48 constituted approximately 30 minutes of data-take time or, in other words, the crew, the spacecraft were operating in a Z-LV mode approximately 30 minutes for the EREP data-take times. What did we get done in the way of consumables? Well, some numbers are rather interesting. We got about 8 miles of magnetic tape, or about 41,000 feet of magnetic tape, along which all the tracks that you see here. We have about 12,800 frames of data imagery from 190A, the multispectral camera system, the Earth terrain camera, and from the DAC camera, which is on board the infrared spectrometer for recording the actual location, the ground location of the data takes for the spectrometers. So, you can see, we collected a lot of data; and, as I said, they are being processed today. I have looked at, very briefly, some of the 190A camera negatives and a very, very small part of what we took, and the pictures do look good. I heard you ask Kenny Kleinknecht how good the data actually are, and I can assure that there are some very interesting features in there, and I'm sure that the PIs are going to be more than happy with it. So, what else did we do, as far as coverage? I think we've got data over 31 states. We collected data over six foreign countries as follows: Mexico, Brazil, Columbia, Venezuela, and part of Bolivia. You can see across ground track 20, you can see where we crossed over Bolivia. Across 48, we crossed over Brazil and Columbia, and on track 5, and on the extension of track 19 and 33. So we did acquire a lot of data for the PIs in those areas. To begin with, each individual PI has a designated task area or task site, as we call them, and it is over those areas that we take, or turn on the sensors and take data. We went back and we tried to determine, based on looking at the postpass weather and looking at the crew voice tapes and things like that, tried to figure out how many of the task sites we crossed over and over which ones we obtained some data. We counted them up. There's about

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186 individual task sites that we collected data over. We turn to the number of PIs who we feel are going to be able to use data. We find that there's about 75 PIs who will be receiving data from the SL-II, and I'm sure this number is going to go up because, as we get all of the film and tape back and we start processing and looking at it from the standpoint of "Did the instruments operate over the individual pass sites," I'm sure we're going to find this number is going to go up. We collected data for only six of the foreign investigators, and there are four in Mexico, one in Bolivia, and one in Venezuela. I'm not sure that we got some data for Dr. Howard over in Colombia, but we're hopeful that we can. Let's turn first to the sensors and see how they operated. We had excellent success. Twelve full successful passes for the 193, the radiometer/scatterometer; and for the 194, the L-band radiometer. The multispectral camera system, 190A, we had one miscue, so we had 11 successful passes. For the 191, actually the infrared spectrometer, we obtained data on all 12 passes for the short wavelength or the visible range of the spectrum; and with sufficient cooling, we got the longer wavelength out into the thermal IR for seven of the 12 passes. On the multispectral scanner, we had nine good passes; we had three marginal passes because we had problems of aligning it - -

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WILMARTH On the multispectral scanner, we certainly had nine good passes, we had three marginal passes, because we had problems with aligning it. After we had completed alignment, we did have very successful passes. The 190B: We operated it only on seven passes. In other words - that's the Earth terrain camera - We operated it only on seven passes and they were all successful as far as we can tell today. There are some highlights, and we did some rather unique things on SL-II that I think are important to bring out. Kenny, I think, referenced the hurricane Eva, as I have here on the board. Let's talk for a minute about that. Can we have the next slide, please? What we did on a solar inertial pass along ground track 6, with the appropriate help from four principal investigators: Drs. Pierce, Ross, Hollinger, and Moore, from NOAA, from the Air Force, and a lot of internal help here at JSC, we completed for the first time a microwave sensing, radiometer/scatterometer data, of 150 data points across a very major storm. This was done in conjunction and concurrently with the NOAA aircraft and the Air Force aircraft, highly instrumented, that penetrated the eye of the storm. The Air Force did a dropsonde in order to determine the actual pressure levels within the eye. And, incidentally, the crew reported that they could see the blue water through the eye of the storm. At the same time, the NOAA aircraft was using for the first time a laser profolometer, which gives you measurement of the waveheights. They reported 45-foot waves in the center of the storm, also 133-knot winds. So, it's a major storm extending out several hundred miles around. Now, the first space sensing with a microwave system has a major impact if all of the data analyses stand up as everybody at NOAA, and certainly the principal investigators, feel that it will. The reason for the uniqueness is that for the first time the backscatter energy from the radiometer and the scatterometer in conjunction with the understanding of the wind velocities and the wave heights, and the foam density, foam distribution within the waves themselves, the total emissivity of the area, in other words, total reflectivity - If we can measure that successfully with the scatterometer and the radiometer, we will have a very direct measurement of wind velocities and wave heights in a major storm area using the microwave sensing instruments, if they're flown on space or on aircraft, or even unmanned satellites. So it's a rather unique experiment. We are very hopeful that is is going to turn out some interesting results. Now, another one that was very unique in that we overflew the Wabash River area of Indiana, where Dr. Silva of Purdue is the principal investigator, almost concurrently with the ERTS overflight of the

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same area with their sensors on and the multispectral scanner that they operated. We also flew at 30,000 feet, a high-altitude aircraft, instrumented with a multispectral scanner and the multispectral camera, and also at low altitude, approximately 20 to 15,000 feet, another aircraft, all concurrent, all within the hour of the overflight of ERTS and EREP. At the same time, the investigator had all his teams in the field taking radiometer readings and soil moisture studies and so on and so forth, in order to make it a complete investigation. What this means, people, is that it provided a multispectral and multistage sampling of an area in clear weather, so that we can understand the operation of the instruments at ground at low altitudes, and at high altitudes, with different kinds of spectral instruments operating. So it will provide us a first comparison, real time, of the ERTS and EREP scanner data, as well as the aircraft data. Now, the investigation that Dr. Silva is primarily geared at is land-use analyses, geological studies and related activity. So we did have a rather unique investigation in this area. Those are kind of the highlights of what we've been able to look at from the overall EREP completions and accomplishments on SL-II. To give you a feel for some of the other discipline areas in which we obtained some data: In the field of geology and hydrology or continental water resources, some of the very best data we feel, was obtained over - Can I have back the ground track slide, please? - over western United States and on down into Mexico, where there are some metal exploration, geological mapping, and hydrocarbon analyses studies going on. As far as land-use studies, data over continental United States and on down into Brazil, and Columbia, for broad regional resource inventories, land-use studies, we feel, are going to be - The data were obtained and they're going to be rather useful for these studies. In addition, we did a lot of data collection over the Gulf of Mexico, as you can see there. The ground track 5 crossed directly over Puerto Rico, and based on the post-pass weather predictions and evaluations, the area was clear. Dr. Trumble of the U.S. Geological Survey is going to be very happy, I feel, with the data from the camera and spectral data of the area to look at some of the water depth, as well as Dr. Pulsom from the University of Michigan, some of the bathometric studies, water depth, water color studies, related to the sedimentation of the area around the Puerto Rican platform. Another area that was rather interesting is that if you see Puerto Rico there, right adjacent to it is the very famous, deep Puerto Rican trench. And I forgot the number of how many kilometers deep it is, but it's a major perturbation of the sea floor.

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And we ran the altimeter from the 193 across the area, and we think that we got some very good data for comparison of the relative change in the sea surface elevation, relative to the land areas, and I'm sure that Dr. Shapiro is going to have some interesting data to look at. In the foreign areas, the Mexican investigators are primarily interested in land use, some agricultural studies, some of the geologic mapping and oil exploration programs, as well as looking at the irrigation, continental water-type investigations, planning of irrigation cycles, and understanding the total water runoff of some of their basin areas. In South America, as I stated, they are primarily interested in broad regional resource studies. As you know, the Amazon River Basin is generally a cloud cover area, and I hope that in the number of passes that we had over there, that we got some real good data, although clouds are rather ubiquitious, they're rather all over the areas. I want to comment on ground track 61. We crossed over the Chesapeake Bay-Washington area, and I think if you heard Paul Weitz's discussion with the TV camera through the VTS vehicle tracking system onboard for the 191 infrared spectrometer, you heard him remark that it was hazy and he couldn't really spot Washington or the Potomac. I've briefly looked at some of the 190A data, and I think we do have a good picture of Washington D.C. and the Potomac. We'll have to look at that after there's some more processing. So all in all, I think we've got some very good data for the PIs. I think they're going to be happy, and I think our results are going to have some rather interesting impact on the use of spacecraft data for regional resources and Earth resource surveys. Thank you.

PAO Okay, Arthur.

QUERY Was there one time on one of the passes when one of the astronauts, in effect, kind of forgot to take the lens cap off, or something like that?

PARKER I think you're referring to the - On the 190A, that's the one pass that we didn't get a full use of the camera. There's a green ready light that's always supposed to be open, the green light was on, but apparently it was not. So after that, we did a visual inspection to insure that the door was left - that the door was actually opened during the ZLV pass. I think that's the remark, the - -

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SPEAKER That the door is actually open during a CLV pass I think that's the remark of the situation.

QUERY Dr. Wilmarth on those 3 passes before the alinement of the instruments was worked out is the data usable?

WILMARTH Yes. Part of the data will be usable certainly in the visible and near infrared. We are not at all sure that the thermal channel during those times are actually that the data are actually going to be used for some of the PI thermal studies but we feel that most of the data will be usable in the channels 1 through certainly 7 to me.

QUERY I wonder was the EREP equipment used over any other portions of the world than those you have shown us.

WILMARTH No. No sir, they were not. Those are the actual data take - sensor on and off times of the - for all of the EREP sensors on SL-II.

QUERY (inaudible) are you planning some kind of a conference with them some time in the future to discuss it?

WILMARTH (inaudible) just before I came over here I checked out to see when we are going to have data available for the PIs - that's the last thing I forgot to mention. The screen film for the 190A multispectral scanner - multispectral camera system should be delivered to the PIs for their use by approximately the middle of July. We're planning a 30 day after splashdown type delivery schedule. For the 191 infrared spectrometer 193 and the 194 the mag tapes and related ephemeris data should be delivered by the middle of July also. Now the 190B camera data - Earth trained camera probably is going to take into August before the PIs start getting some of the data. Now the 192 is a little bit different instrument. In order for the PIs to select the channels - whatever channels they want to work on of the 13 and the specific areas within their test site, in other words, cloud free or whatever areas they want to work on. We are going to provide them by about the last week of July a screening film which is actually a tape to film conversion so that they can look at series of channels of the areas that they are interested in and then provide the inputs as to the type of data, mag tapes and everything else that they'll be wanting. So we will certainly be looking at the later part of July, and that is up to the PIs to get their request back to us and then there's going to be some time, probably - maybe a couple of months before they actually get some of their mag tape data to work on. Now that's as we proceed through this system why we'll probably modify that - that's probably an outside number. Now in regards to your question on what are we planning for

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a PI conference or a PI release of their data, some thought has been given to having a PI preliminary conference sometime this fall but it is a matter of when the data is going to be released and PIs do have to have some time in order to analyze their data, be sure of their results so - it's questionable whether we'll have one this fall but the - next spring - next summer is going to be a major press conference and PI conference for the PIs to present their results and so we can proceed.

QUERY Dick, I'm a little confused over how many foreign countries you've got. You said 6 and then you only named 5. Mexico, Brazil, Columbia, Venezuela and Bolivia.

WILMARTH Oh, I'm sorry, Nicaragua. I forgot one. And I'll repeat them people so you'll have them. Mexico, Brazil, Columbia, Nicaragua, Canada and Bolivia. Dr. Stuart, I think you're going to get some data off of the coast of Vancouver Island. 1, 2, 3, 4, 5, 6. Mexico, Brazil, Columbia, Nicaragua, Canada and Boliva.

SPEAKER Let's begin at the top, can we people, and say that there are 6 foreign countries and they are as follows: Mexico. Brazil, Columbia, Nicaragua, Canada and Bolivia. If I said Venezuela I am mistaken.

QUERY Dr. Wilmarth, I understand that the main purpose from your standpoint was to test these instruments and find out how they would serve and whether they would serve, but at the same time you were also gaining data and trying to use the data. Now we've been told at times that one idea was to get this data available rapidly so that in circumstances like danger of forest fires, like corn blight or other diseases, the investigators or some investigators could actually use this data during the growing season, something like that. Now you're telling us that several months to a year - would you comment on that?

WILMARTH Well, first of all, let's comment on the objectives of EREP. Now EREP was designed as an experiment for 3 general purposes: 1. to determine how useful microwave data are from space in Earth resources. Secondly, is to determine based on the camera and the scanner as well as the microwave systems which ones or which of the spatial spectral bands are of most use for Earth resources survey. And the other one of course is a very important one and that is to determine what are the atmospheric effects on all of the analysis of the data. As you all ready know we do look through the total atmosphere flying at 234 nautical miles. So looking at those 3 objectives I think that the sensor operations and the data we're going to have back from the PI's are going to clearly demonstrate how useful the scanner cameras and the microwave systems are for Earth resources. Now you are correct.

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The data that we are getting back from the PIs and the results will have a direct use - certainly by many regional planners, urban planners, agriculturalists, forest inventory people as a means of getting out a better system for them to acquire their data to do their inventory and do their management planning that goes on with all of these activity. So EREP is going to have two purposes: one, to gain knowledge for use in future system and also as a direct use for the data, now we come to SL-II we certainly have some data that we could fly SL-III over the same - rather typical ground tracks - this is going to be of interest to certainly the agriculturalists as well as forest inventory people to plan some of their activities. Now how useful is going to be dependent upon their own initiative and own ingenuities as to how useful and they want to plan the data. Now I stated that it's going to be approximately 30 days - 30 to 45 days for the PIs to get their data off of the 190A camera. The 190B camera system, certainly the screening film off of the 192 system is going to be available approximately within the same period of time. So the analysis of the data off of those instruments as well as from the 193 and 194 which certainly is going to be within the same period of time, well the analysis is going to be available to us and certainly will be put into reports released through the PIs own organization, technical journals and through the data centers to people who are interested in the results of the EREP analysis. In other words, there's not going to be a restriction on the PIs turning out their data and turning their results into technical reports releasing the data. What I'm saying is that it may be as last as next spring before we have a full scale total review similar to the one that was conducted by the ERTS people last March. So the results will be made available maybe not as a full compendium or a symposium type publication, but the data will be available.

QUERY (inaudible) we cannot look to these instruments anytime soon to give us fast turn around on data we get from space -

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QUERY - instruments any time soon to give us fast turnaround on data we get from space?

WILMARTH I guess the answer is that it will depend upon what kind of a spacecraft, whether an unmanned, or even a high-flying aircraft, how the instruments are used. In other words, if you could put the same instruments into a Sun synchronous orbit over the United States. And looking at the United States on a - on a continuous basis, or even on a - on an 18-day cycle such as ERTS, the data would then be available and the kinds of information that people need on a real-time or a near real-time basis probably could be made available. But, at the present time, you know, all of the data are stored and returned from EREP. So, it's a film return as well as a mag tape return. There have to be modifications to the system to accommodate the real-time data dumps.

QUERY There's something that I'm - not quite understood, and this sort of reminded me of it. Why, in designing the system, would you place it such that Skylab would have to be oriented into this Z-local attitude in order to use it? Why not put it someplace where you would not have to disturb the attitude of the spacecraft in order to use it?

WILMARTH Well, I can't answer that. I do not know why. I do know that EREP was the last series of experiments to be accommodated by Skylab. I think that probably is the answer to the question you're raising as to why you have to go into ZLV. It was put into the area where they could accommodate the control panels and the instruments themselves, and it just so happened that is was in the MDA and it has to be moved in order to be sure that they're all looking vertically at the Earth. That's the only answer that I know of right now.

QUERY What are your plans now for the next mission, and will you have to do a lot of real-time planning as the results of the first mission become known?

WILMARTH SL 3 is going to provide us 26 opportunities I understand, for EREP data-takes. Right now, we are reviewing the - the overall schedule, the plans for the flight planning, and related activities, in order to optimize the times for taking data relative to the PI task sites and to their data requirements. So, in essence, be prepared as we move into flight planning for SL-3, that we have an input on what ground tracks to use and when we take data. As you look at SL-3, most of the early part of SL-3, we're going to have a series of descending passes very similar to what I've shown you on SL-II. Later on into the mission, we will have ascending passes. In other words, from the southwest to the northeast across the United States, and over into Europe. We plan to extend the passes within the capability of the system, as we see it today. As on the latter part of SL-2, the 30-minute data-takes will extend on over in to Europe and take our - get some data for our European as well as some of the African PIs. Then hopefully we will be able to accommodate some of the PIs over Japan, Thailand, and Australia. So, it's a matter of planning and trade-offs from what we've learned on SL-2.

QUERY Do you forsee changing your system of weather predicting so that you con't run into so many clouds, and the whole protocol of deciding when you're going to make the passes?

WILMARTH Well, we've talked to the weather people about that - to see if we - (laughter) - to see if we can get better accommodations out of the weather bureau, but that's a pretty tough job, I'm sure you all recognize. Unfortunately, clouds move around pretty fast, and we do have to select the passes based on our weather predictions. I think that - that we looked at the overall forcasting that was done and the post-past verification of the weather, was done very well. But, when you're restricted to descending passes across the United States in June, June is a very bad month, and we are not planning to change anything relative to our weather forecasting that we know of today, for SL-3. We will have some more options, of course, because of the longer data-takes, and, therefore, we will be able to select essentially cloud-free areas to - to sense with our instruments. But, I don't think we're planning anything today on changing the weather predicting and forecasting system. Does that answer your question?

QUERY Could you go a little bit into how flexible you are as far as - as far as - proposals coming in over the transom now that EREP is an accomplished fact? For example, a possible EREP data-take over Africa surfaced toward the latter part of the last mission, and then disappeared almost as rapidly as it had come. And I was a little mystified. The Flight Director at the time explained that they're having a drought in Africa, and bad things were happening, and perhaps the pictures could do some good. What kind of facilities do you have to accommodate quick requests like that, if any?

WILMARTH Well, as you know, the Hurricane Eva pictures and sensing that we did on SL-II was a very similar case. The storm developed - we had requests from the PIs and through NOAA to accommodate such a an EREP pass. And the system was worked so that we did accommodate that and I think the results are going to be very gratifying. As far as taking on additional tasks, the system is that flexible to accommodate these things. And I think the case that you reference is pretty late in the mission. And the matter of getting all of the tasks done in order to - for reentry, and setting up housekeeping for the next crew, just prohibited any other additional time for the crew to operate any of the - the EREP instruments. But the system is that flexible. We can accommodate these kinds of tasks and I'm sure that - that's why I referenced to Africa on SL-III. We have some passes directly over Molly, and that area, where the drought is pretty severe. And that's going to be - certainly one of the considerations as we go into our pass planning.

QUERY Is that - is there any chance you'll be doing some EREP passes over the Soviet Union or China?

WILMARTH No, we do not plan any. As a matter of fact, our sensors are turned on only over the areas where we have approved investigations, or the designated task sites, and we don't plan - we don't have any investigators in these areas.

QUERY What's the last possible time you can make your decision before you make a pass? How many days elapse between you say we're going to go - we're going to take this pass, or we're not?

WILMARTH Our planning cycle is approximately - has a mean time of two days. In other words, we do a pass selection. Say one evening - we go - we do a - an evaluation 1, which is one day prior to the pass. In other words, we do that at approximately - oh, six - seven o'clock at night for the execute day tomorrow. In other words, one day away from the execute. And that's a GO or NO GO. We do the the pads - in other words, the directions for the crew for turning on instruments and types of films and film - filter settings and things like that. So, by 11 o'clock that night, the pads are generated and uplinked to the crew. So that when they get up in the morning for an early morning pass, they have the data available for an EREP pass that day. So that's the kind of timing sequence that we do.

QUERY Do you plan to go over some of the same sites that you went over on SL-2?

WILMARTH Yes. Because some of the PIs have requirements for data-takes on SL-2, 3, and 4. So we will be overflying and, hopefully, we're going to overfly Houston this time so we can get some data for the - our own PIs here. Yes, we will be doing that.

QUERY Well, if the clouds move in between - -

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WILMARTH Yes, we will be doing that.

PAO Carol, one more?

QUERY Well, if the clouds move in between 11 o'clock at night, when you send up the request for the plan, and the next morning, are you stuck with it?

WILMARTH No, we can always postpone a pass. We can always scrub a pass. In other words, we can scrub a pass at 6 o'clock that following morning, or 3 hours prior to data-take time. Yes, we're not stuck with that; we can do that.

PAO Okay, ladies and gentlemen, thank you. Take one more?

SPEAKER I have a couple of announcements here. As we said earlier, Dr. Hawkins is running late. He is still in the flight readiness review for Skylab-III, and we don't expect him to be here, no earlier than 4 o'clock. However, if all you visiting firemen please check with Judie, who is in charge of our coffee greens, there is something for you planned for tomorrow evening, all the visiting troups, okay?

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SKYLAB NEWS CENTER
Houston, Texas

SL-II Postflight Review - Crew Health
Johnson Space Center
June 28, 1973
4:47 p.m. CDT

Participants:

Dr. Royce Hawkins, Deputy Director for Medical Operations
Bob Gordon, PAO

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PAO Okay, ladies and gentlemen, we're sorry for the delay, but Dr. Hawkins is a busy man, so without further ado, Dr. Royce Hawkins, Deputy Director for Medical Operations at the Johnson Space Center.

HAWKINS Good afternoon. I'm sorry again to have to apologize to you for being late. It seemsd like I've been running pretty late for a lot of these meetings with you. But let's say that today has been a pretty important day to all of us in that this is kind of the kickoff of the flight readiness reviews for Skylab III. And so it's upon us, and we are really beginning to feel it. I might try to just recap briefly that we have covered an awful lot of ground, but I think, all in all, at least at this point, that things look to be in very good shape for the launch of Skylab III. There's still a lot of open items that have yet to be closed. But I think, all in all, it looks very, very good. Now, what I had planned was really to try to recap briefly what had happened and then concentrate on the time since the recovery as to what has happened to the Skylab II crew. I think that most all of you have been present, and certainly are aware of the weekly progress from the get-togethers that we've had to try to keep everybody updated and apprised of the developments. But, to look back over the mission, we had, in the major medical experiments, the M092 and the M171 studies, very interesting findings that were a little surprising to us. With the 171, the bicycle ergometer study, we found that the crew, all three stayed right within their preflight baseline envelopes. In the 92, we did see some changes and some individual differences, three individual differences in the crew, in their particular response to the lower body negative pressure study. Now, in the immediate postflight, we had again three individual variances in the response that we saw in these three crewmen. All three of them did experience vestibular disturbance that lasted about 3 hours in the commander, about 8 hours in the pilot, and it was through the R plus 1 day, up until the R plus 2 day before he was completely free of any symptoms, SPT. Now, the response postflight then, in the lower body negative pressure testing, we found that certainly all three did exhibit some degradation in the cardiovascular response to the negative pressures. This was certainly not unexpected, as we've talked about before. The science pilot, with the vestibular disturbances and the orthostatic hypotension that he demonstrated, he was unable to complete LBNP that day, and was not subjected to the 171 run on R-0. The other two crewmen did complete the runs, both the 092 and the 171, but they were definitely running higher pulse rates,

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heart rates than they were in the preflight baseline measurements. Now, it - we ran them on R-0, R plus 1, R plus 2, R plus 4 back here, and that is the last measurement that we have in the major medicals. Now, all three crewmen are still not back to baseline as of R plus 4. They'll - the pilot is very close, and I would say that the commander is probably next closest to his baseline measurements, with the science pilot still the farthest out, but all of them approaching very, very closely to their preflight measurements. And I think that the next evaluation of these patameters will be on Saturday now. I think that we will find that they will probably all be well back on baseline levels. The other very interesting study and very interesting findings were, I think, with the 131, the M131-1, which was the motion sensitivity test. Now, preflight, we established what was a baseline level and a specific rpm rate of rotation for each crewman, in which he would undergo a certain amount of head movements. Now, preflight, and remember we only do this on two of the crewmen, the pilot and the science pilot, we established their threshold level of motion sensitivity, the point at which they would begin to develope symptoms of motion sickness. With the commander, I mean the science pilot, his rate of rotation was 12-1/2 rpm, under which he could do 50 head movements before onset of symptoms. With the pilot, it was 15 rpm and 40 to 50 head movements. Okay now, in flight then, we saw a very dramatic change in both crewmen, where they were doing 150 head movements at these rotational speeds, without any symptoms whatsoever. And then, if you recall, we gradually increased this and the rate of rotation, first to 20 rpm, then 25, then finally, on the last run they made in flight, at 30 rpm, and they were still doing 150 head movements without any symptoms. Now, post-flight, we saw some very definite vestibular disturbances in all three crewmen, with nausea and even vomiting in the one crewman, the science pilot, at about an hour after he was aboard the ship and in the medical labs. And his symptoms with head movements persisted through the next day, where any movement of the head would precipitate the onset of dizziness or vertigo and stomach awareness. Then this completely cleared, subjectively, in all three crewmen by the end of R plus 1 day. R plus 2, they had no problems whatsoever. You remember they made the trip to San Clemente that day. They flew the helicopter ride satisfactorily, without any problems. They returned to the ship. We conducted the R plus 2 physicals, and then they immediately boarded the plane to fly to Houston. On R plus 3, we performed the first M131-1 study postflight, and that was done here. Now then, in both crewmen, they were able to complete the original baseline rpm --

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HAWKINS - M131-1 study postflight, and that was done here. Both crewmen - they were able to complete the original baseline rpm, 12-1/2 for Joe and 15 rpm for Paul, but they were able to complete 150 head movements without any symptoms. Remember that preflight they were only able to complete 50. So there's still some evidence there of some - some adaptive change that did take place in flight that was still present postflight at R plus 3, in spite of the fact that we did see a lot of vestibular disturbances immediately postflight. We're still trying to look at this; we have not yet really had a chance to sit down with the principal investigators for this area, Dr. Miller and Dr. Graybiel. We will be doing this and, again, we will be measuring the second M131 in both crewmen on Saturday. That's about it, Bob.

PAO Okay, gentlemen, ladies, please wait for the mike; right here.

QUERY Doctor does this all suggest that perhaps all three became seasick and that was the reason for their disability on recovery?

HAWKINS Well, I think definitely you've got to rule in some actual seasickness that perhaps, maybe precipitated the onset of this thing; however, I don't think that the persistence of it that we saw was anything other than a change that was taking place again in the postflight period. I can't help but feel that this is a readaptive process that's taking place in the vestibular system to the one-g conditions. I think very definitely there's an awful large amount of that.

PAO Bruce Hicks.

QUERY Have any previous tests on these crewmen or anybody else that you know of shown this progression, this adaptive change that you noted in the 131 or similar experiment?

HAWKINS Preflight - in the pre - like Apollo flights, are you talking about?

QUERY Well, yes, either Apollo, or even ground tests. In other words, what I'm trying to say, is there a direct relation between spaceflight and being able to come back and do 150 head movements instead of 50?

HAWKINS Well, we really don't have any good data on this, see, to compare it with, because we've never had the opportunity of measuring that in flight before. And right now, postflight we haven't seen anything quite this dramatic at all. There's been changes and definite deviations from preflight evaluation in those Apollo flights where we did study similar - perform similar studies, but nothing that was quite this dramatic.

QUERY What does this indicate to you, other than it's an adaptive change. I mean, what does it mean? You know, is it great the guys can come back and get dizzy in the whirling chair or what?

HAWKINS Well, we're on a frontier and we're learning and we're trying - as we identify these changes, then we've got to have a chance to analyze the data to really have a - come up with an understanding of what it really does mean to us. It could well mean, okay, as I think, we're learning; this is a part of the adaptation that must take place under these set of conditions for a crewman - for a human being to perform satisfactorily in this environment. And then you subject him to a return to one-g conditions, and he has to readapt. And he has to go through a change that alters his physiology again to restore it back to what he saw previously. Now, what does this mean in the way of - to future flights? Are you going to have to provide some type of protective mechanism, to develop some set of procedures or some type of training exercise that they're going to go through that's going to alter this, of course? These are questions that we've got to look at and try to answer.

PAO Arthur Hill.

QUERY Okay, Dr. Hawkins, would you say that the Skylab astronauts are - how would you compare the rate at which they are readapting to Earth's gravity with the experience of the previous Apollo crews? And, also, if you think that between now and Saturday, when your next examination comes about that they are going to be back to their preflight norms, why are you going to wait until Saturday? Isn't it important to find out precisely when they're going to do this between now and Saturday, if you think by Saturday that will be done.

HAWKINS Yes, it's very true Art. But we're caught up here within an operational problem, with the amount of time that we have to do all of these good things. Now like yesterday and today, we've been - we've had all of our people tied up doing F minus 30 examinations on the Skylab-III crew, and we're just one man deep in so many areas. We've got to spread some of this out. We really feel like this Skylab-II crew is close. They're really close to their baselines at R plus 4. Yes, I'd like to have seen them again on Wednesday and again today, if it had been possible, but it just really wasn't.

QUERY The comparison, are they readapting more slowly, faster, or what?

HAWKINS Well, I think the - very definitely I think they're slower in the - than what we saw for the majority of Apollo crewmen. We did see in one crewman in Apollo 15 where Dave Scott and Jim Irwin both were slower than what we saw for other Apollo crews in returning to baseline. In fact, all three of those Apollo 15 crewmen were slower in returning for some reason. And Jim Irwin was really the longest at R plus 5.

PAO Roy Neal.

QUERY Royce, so far, you've covered cardiovascular response and motion sensitivity. I wonder what other changes or what other bodily functions might have been affected, if any? And, also, did you notice any leveling off here of the adaptation process with these men over their 28 days? Any way that you could pin that down?

HAWKINS Okay, about the leveling off, I thought, at several times, that we did see leveling off. And yet, then we would see again a change. I'll give you an example; that's the best way to do. With 092 on Joe's first - well let's see, his third run, he - we saw the first change in his performance capability. And he had to terminate the minus 50 negative pressure run. Therefore, we put him back to a minus 30, minus 40, minus 40 for the balance of the mission. And then it was on the - let's see, I forgot the exact number, but it was about the third to the last run he made then, he was doing - right up to that time, the second time where he was unable to complete the last minus 40 run, everything looked stable and then it all - he broke rather suddenly then. He was not able to complete that last minus 40 exposure. So it was terminated after 7 minutes into that run. And then he stayed at that lower level then through the remainder. Now, Paul showed his first change at about his seventh run, I believe it was. And he never showed a change again, although I kind of feel like that had - that there was a slight change and a slight trend toward increased heart rates as we look back, and as the flight progressed there where I felt like - -

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WILMARTH - we - as we looked back, and as the flight progressed there, where I felt that had we probably ran him another time or two, we would have seen a similar change, as we had in Joe. But it - Within that time duration it didn't happen. Pete's was - The only thing we really saw there was elevated heart rates over the baseline values. And he was always able to complete his entire protocol. Now, with the exercise response work performance - They stayed right in there int: - in the preflight baseline envelopes, throughout the whole mission. There wasn't any - there wasn't - There was no trend whatsoever, of deviation. And - (laughter) - -

QUERY What other bodily functions - -

HAWKIND And then - -

QUERY - - have you observed?

Hawkins And what other bodily functions? Well, okay, now I - those were the - the measurements were - and were - Here, we're looking at gross physiological changes and all. We have not yet really got any of our laboratory data in hand, other than some of the - the hematologies, which the immediate - immediate postflight hematologies. Now, all the chemistries and the hormones, endocrine studies, all this is - is still coming forward. It's being processed; we did get all the inflight samples back. They're in good frozen condition, and these - these were immediately put into the lab and started through an - analysis. But, it's still just a little bit early to have those initial results back, and I don't have them at this point to really say what changes we might be seeing there. We'll get them back sometime over the weekend. I hope that we will begin to get some of the early - early data out.

QUERY I just the key to the thrust of my question - and I'll stop here. Al Bean, for example, said he's going to walk out of that capsule if he physically can. And I guess I'm asking you to extrapolate just a little bit whether you think he's going to be able to do that after 56 days?

HAWKINS I would like to - I guess I would like to have a chance to look at a little more of his baseline - preflight baseline data, Art, before I commit myself too far. I'll say this, I think Al's a pretty fine guy and I think he's a pretty determined guy, and if determination has anything to do with it, he's probably going to do it. But, here again, I think within Skylab III - We're going going to be flying again three different individuals, and I don't doubt but what we would begin to see some - some individual variances here - from what we saw in Apo - Skylab II. And although I

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feel - I personally feel confidant about - about what we have seen thus far, and granted, we still have to look at all the inflight samples that were brought back yet, to - to have a complete understanding of what man's response is to this environment for 28 days. I still feel confident that it's going to tell us that "yes, we feel he can - He can fly a 56-day mission."

QUERY Royce, R plus 4 was your actual last physical exam. And at that point you were still seeing elevated pulse rates? And - presume an elevated blood pressure. Can you give us an idea of what you were saying in numbers of - and the baselines?

HAWKINS Jules, I don't have the exact heart-rates here with me. If you'll let me just - like - tell you in terms of Deltas. Maybe that might suffice for our - I can dig them out for you a little bit later. Bob ran over and grabbed me out of that conference, and I didn't have time to get too many of those individual data points with me over here. But the - let's see - like - Like from their baseline, we were seeing - oh, 10 to 15 beats - and closer to 15 beats higher in the resting heart rates for the crews with a - with a similar elevation at the - under the work stress. Now, this is immediate postflight. Whereas inflight, for the 092 now, there were - Remember 171 was right on the line. So, M092 inflight, they were running somewhere around - oh, five to 10 beats higher, very - fairly consistently. Now then, at R plus 4, then the last measurement we saw - well, even R plus 1 and R plus 2, this delta began to drop, and it began to narrow. And they're running about five beats higher - five to eight beats higher now, than what they were baseline.

QUERY How about blood pressures?

HAWKINS And the pressures were not a lot different than what we really saw in the - in tthe preflight period. They're not - they're not - There's not that much significant difference there. And that's true inflight too,with the blood pressures. They seem to hold there until at such a point they begin - They would break. They tend to reach their threshold level. And then you'd see a rather dramatic drop in them.

QUERY This is probably asking you to extrapolate prematurely or anticipatorily, but do you see anything in your findings so far that lead you to think you are going to call for exercise changes or modification of exercises to enable Bean and company to do the 56-day mission better?

HAWKINS Right.

QUERY What do you see?

HAWKINS I think that - I think we've seen one very interesting thing here in this crew. And, as I say, we've seen individual differences here in performance to the - the M092. We've seen differences in the postflight period to all of the measurements, and there's - I think one very outstanding finding in the inflight period, is the amount of exercise that these - that these three crewmen performed. And if you line up their performance, inflight and postflight, with the amount of exercise that each one did inflight, you'll find that Pete did the most exercise, and he really showed the least change. Paul was next, and Joe was last, in the amount of exercise they performed. I - You can definitely correlate it with the results that we see.

QUERY You're going to call for them to exercise more?

HAWKINS More.

QUERY Any - Any new exercise devices or methods?

HAWKINS I don't know that we - I don't know that we need any - really any new devices yet, Jules, I think the - the exe - the - ergometer is certainly a - a wonderful tool for this. But, we gave them 30 minutes for Skylab II, and I know Pete used every minute that he had available to him, and he worked hard at it, and religiously. And, the other two a little less so, and it shows up because we have the actual wattage of energy that's been expended throughout the whole mission on their personal exercise program. So we're really going to recommend, very strongly, that the Skylab III crew have at least an hour, preferably maybe an hour and a half of personal exercise time.

QUERY Is that per day?

HAWKINS Per day.

QUERY You said on the Sky - referring to the Skylab III crew that it looked good but there were still a few open items yet. Could you elaborate on those open items?

HAWKINS Well, - oh, gee, - I - I don't whether I could or not. These are like cameras that, you know, are still being evaluated - Well, no. We don't know - We don't have any real significant open items in the way of - of problems. These are items that have yet to be closed out, like the physical examinations to be done down the line. No, I think - I think our hardware is - anomalies, and everything have been pretty well worked. For example, the leg bands, if you'll recall, that was another significant finding, an interesting finding, that we found in Skylab II, and very early in flight, too, where the calf circumference decreased. And we say rather - very significant deltas during the negative body - lower body negative pressure testing, were in the leg volume - very significant changes. Okay. Now, as

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the flight progressed there we found that the size leg bands that we used to measure the - the leg volumes with, were too large. Now - So we're putting aboard some smaller sizes - -

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HAWKINS - the leg volumes with, were too large. So we're putting aboard some smaller sizes, in the event that we see a repetition of this in III.

QUERY Are you going to have the crewmen exercise every day on SL-III?

HAWKINS That's what we're recommending. Now that hasn't been worked out yet. I mean, that's just - that has yet to be fed into the Program Office for management consideration. Now this will have to be worked with a lot of the other time - you know, a lot of the other things that are in the time lines. It's obviously going to take a lot of time out of something. And I don't know what that really means yet, but that's a personal recommendation at this point, the way look at it.

QUERY Have you seen, on previous flights, any indication that the speed of recovery was corollated with the amount of exercise, or is this new to Skylab?

HAWKINS We've never had this accurate a measurement of personal exercise before to see.

QUERY Blood pressure and the persistance of blood pressure and increased heart beat, is that something - is that length of persistance to R plus 4 greater than you've seen in earlier flights?

HAWKINS No, not greater, really. The Deltas are really not - not really much different than I guess what you'd, you know, if you lined them up with each of the previous - Apollo missions, you know, and Gemini, but the time duration, I think, is really one of the critical things.

QUERY Then you're thinking of actually doubling the amount of assigned exercise time from 30 minutes to an hour a day.

HAWKINS Yes, that's what we'd like to see them do. I think it would be beneficial, really.

QUERY With your experience now, do you - with the total experience, do you believe that air experience plus space experience - the amount of air experience plus the amount of space experience represents an important factor in this adaptive process, the total adaptive process?

HAWKINS Okay, you mean now, the amount of actual flying time that the guy -

QUERY Yes, flying time plus space time.

HAWKINS Well, I haven't, I really haven't had a chance to try to corollate their total flight-time history with the symptoms we've seen. I think that's a good point, really, which I think would be good to try to look at. I must confess, I haven't had a chance to do it though. But what we have seen, at least in Apollo, was the amount of acrobatic flying that the crew would do just prior to a mission, which did seem to have some beneficial effect. It is some conditioning or preflight conditioning of the vestibular system, so that the crews, I think, that did undergo this, following Apollo 10, perhaps may be - you perhaps could say yes, they did seem to do better in that initial early few hours of the adaptive processing. But it's hard to quantitate that really. I know that Tom Stafford, he's the one that advocated this and he really took his crew out and really wrung them out in acrobatics just prior to the Apollo 10 mission. And not a one of those guys had any problem. They didn't show symptom one, really. But subsequent to that, other crews tried to do the same thing; I don't know what amount of flying time they were able to squeeze into their busy schedule, but the - we did see motion sensitivity problems develope early.

QUERY How much weight did each man lose?

HAWKINS Okay, let's see. Preflight weights on the commander was 136.75; science pilot, 171.25; pilot was 175.25. Now the last inflight measurement that we had was commander, 133.9; science pilot, 166.2; and the pilot 169. Now then R-0, the immediate postflight - postrecovery weight, then, for the commander was 132.7, the science pilot was 163.75, and the pilot was 167.5. By the next day they had, well, the commander and the pilot had picked up just about a pound, and the science pilot was down a pound. Well, I think it really, it isn't a lot different from what we have seen in previous crews. Paul showed the greatest loss there, which looked like, what, about 6 pounds over - no, wait a minute, about 9 pounds over his preflight. That's a - I think that might possibly be about the most weight loss we've seen in any one crewman, but we've seen others that have run up to 6 or 7 pounds.

QUERY Do you suggest anything about a change in eating habits on the next flight?

HAWKINS Actually, I think the - really, I think the crews have done real well by their diet. And I don't really contribute this loss to any nutritional deficiency. I think they had adequate diets. They did eat all of the food, for the most part. Pete, I guess was really the best at eating everything. But at no time did he complain of being hungry or feeling that he had an insufficient amount of food. And I'm not sure yet, Martin, I think some of this loss that we see here is probably not only fluids, but mass, muscle mass tissue. And, again, this has got to be a part of the adaptive process that takes place in weightlessness.

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QUERY Getting back to the exercise, Doctor, I assume you were talking just about the bicycle ergometer exercise and were not cranking in any EVA exercise that you didn't have precise watt-meter numbers on. Can you discuss the more or less sporadic exercise that they get and what effect that might have? I recall, particularly, it seems to me that the Apollo 15 craw did an awful lot of work on the Moon, particularly Dave Scott, wrestling with that drill. And does it have to be a particular kind of exercise, or is just any kind of physical labor beneficial?

HAWKINS Well, the bicycle ergometer is really designed to stress the cardiovascular system, and you really don't get an awful lot of muscular exercise out of it. There's some, but it's not specifically designed as a muscle-building exercise device. It's a cardiovascular conditioning device. And there, I think, is where we really saw the maximum benefit from it. Now, I think the other part of the exercise program does need to direct attention to muscle mass retainment, building it and retaining of the muscle mass itself, its strength. So here you get into the different types, other forms.

QUERY Well, to follow up on that, are you looking at any kind of different exercise programs that might be implemented, if not in Skylab III, then in Skylab IV?

HAWKINS Well, no, to answer your question -

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QUERY - and if not in Skylab III, say, in Skylab IV?

HAWKINS Well, no. To answer your question specifically - No, we have not as yet really turned all of our attention to bear on what type of a new device we ought to be looking at. We've not done that yet.

PAO Arthur, then back to Carolyn Callahan.

QUERY Well, Dr. Hawkins, given this apparent relationship between exercise and the physiological things that you mentioned, where does this leave us as far as the dream of the average man going into space via the space shuttle? The non-scientists and those sorts of people who aren't finely-tuned physical specimens - Are we not limiting this then to space for the astronauts? Where does the general population fit into this?

HAWKINS Well, I don't know where they fit into it yet, Art, really. And that's what we're - that's certainly one of the things we're trying to find out with Skylab, because remember this is the first mission where we really ever had an opportunity to look at man in his totality within this new environment that we're expecting him to live in and work in for extended periods of time. I don't know yet what that answer is. I think, based on what we find, we'll find ways, if we need those people there.

PAO Carolyn.

QUERY Well, I guess my question kind of ties in with that. You thought at one point, Kerwin had reached his adaptive point, and then you say he didn't, apparently. Are you saying that none of them reached that point and leveled off? In 28 days -

HAWKINS No not really, because we saw three different responses, in three different individuals. And, yes, if you look at Pete, you'd say that it looked like he adapted over whatever few hours or days it took, and here again, we were delayed in getting some of these early evaluations in, because of the thermal problems and all that we had to deal with there. But it looked like - You could well say that he was adapted for all intensive purposes through the 28-day period.

QUERY Before he went?

HAWKINS Well, no, not before he went, because he definitely showed differences and changes from his baseline preflight measurement in the 092.

QUERY Can I ask another question about food? Do you have - Have you completed your sampling on the food that was brought back and what does it show?

HAWKINS No, we have not and I can't fill you in with any information on that right at this time.

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QUERY Before the flight there was a great concern about calcium loss and the possibility of - remote possibility of broken bones, have you had any reading on calcium loss?

HAWKINS I do not have any lab data out yet, Norton, and I really don't have any specific data back from Dr. Vogel, who's the PI on the bone mineral scan. His initial evaluation, two days ago, was that there was no appreciable loss seen. Now, he's holding up his final analysis report on that until he's had time to do all his calculations.

PAO Pete Bowman, over here.

QUERY Have you had any interesting subjective impressions from the crew as to what it's like being back, say, the first few days after they were back, as far as awakening, and some of their activities immediately after awakening, walking? Have they mentioned any muscle soreness as a result of getting back to using the old Earth muscles again, things like that?

HAWKINS The - well, all I can talk about are what the initial first 2 or 3 days were until they got back here. I really haven't had a chance to explore any of these things with them, and won't have, really, until we get into the medical debriefing, which is next Tuesday, to get down into some of those type of details again. But, Paul Weitz exhibited the greatest amount of muscle soreness, and joint pain, and this is primarily within the back, some cervical area, low back area, and his knees. The other two didn't really complain about muscle soreness. This is postflight, now. That lasted with Paul over the first 2 to 3 days, with, I guess, perhaps some gradual improvement of it. Interesting enough, this is one of the things which I recall having been commented on by the Russians on their Soyuz 11, 18-day flight. That the crews did experience a lot of muscular ache and pain that persisted for days. But the other two our other two crewmen didn't show anything like this at all. It's just that Paul - They did complain of a feeling of heaviness, that rapidly changed and diminished after being on the deck, during the first day, even. But like one - I forget now which one it was - He said it felt like, well, like one g was like about 2 to 3g to him. And - But this gradually diminished and I think by the next morning, after a good night's sleep and everything, they felt pretty normal.

QUERY Just to make it a bit easier, on me at least, how would you rate their hearts, their stomachs, their muscle tone, as of today, compared with postflight readings?

HAWKINS Oh, man, I'd say they're - I'd say they're

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back, fully back to normal, with the exception of the - of the - leg measurements, which have not yet returned to preflight measurements. They're still about - oh, they're still I think, 2 to 3 centimeters less circumference measurement than what we - we saw preflight. That is not fully returned yet, but - -

QUERY Is that a pooling problem, or a muscle problem?

HAWKINS I think it's a mass - muscle mass tissue.

PAO Okay. Thank you, ladies and gentlemen, Dr. Hawkins. I want to remind everybody about tomorrow's briefing starting at 9 o'clock. Skylab II press conference - the main auditorium.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Skylab II Crew Medical Status Briefing
Johnson Space Center
June 23, 1973
1:13 p.m. CDT

Participants:

Dr. Royce Hawkins, Deputy Director for Medical Operations, JSC
Terry White, PAO

SL-II PC75A/1
Time: 13:13 CDT
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PAO A medical status breifing on the Skylab crew. Dr. Royce Hawkins, who just resently talked to Dr. Charles Ross out on the Ticonderoga. Dr. Hawkins.

HAWKINS Fine, Terry. Yes, well, this morning as I had hoped for, things are definitely looking much, much improved and better than they did at first evaluation last night. Now the Commander has this morning looks in excellent shape and there's certainly no anticipation of any type of problem with his performance today. Paul Weitz also looks to be in excellent shape. He has no residual effects from the vestibular disturbances of yesterday and it is inticipated that his - his bicycle ergometer rerun today will be uneventful. Now the - for Joe, I feel like that - that he is a thousand percent better today from the cardiovascular standpoint. He still has some residual effects from the vestibular problem. And what happens is on head movements at times he can still produce some nausea and dizziness. However, at the time we talked with the ship he had just completed the M092 run, the lower body negative pressure run, and he performed through the minus 30 and twice through the minus 40 levels, millimeters of mercury levels, without any symptoms. And at the time we terminated our talk he was on the bicycle ergometer. And you'll recall last night, I told you that he was not able to perform this test yesterday. Now I do not expect to really see any significant problems here with Joe today. They - they all got a good solid twelve hours of sleep. which I think they really needed. Paul and Joe say they don't even remember their heads hitting the pillow. From a nutritional standpoint, yesterday, I think they were all a little bit off on their diet. Fluid intakes were fairly good. Pete and Paul did have an extra snack before retiring last night. This morning Joe had a hearty breakfast and is - has really regained all of his appetite, so I think that's a good symptom. Okay.

PAO Please wait for the mike.

QUERY Dr. Hawkins what about the San Clemente, has it been cleared for that?

HAWKINS Well, now just after our conversation - yes, we talked with Dr. Fletcher in Washington and as well as Dr. Low and Mr. Myers. We told them what the findings were here this morning as I've told you, and we feel medically that we can - we can recommend a GO at this point. Now this is understood that - that in the event that something happens between now and then, obviously it could change the plans, but I don't expect that to really happen. But they all understand this and I believe Mr. Donally told me that Dr. Fletcher has given the - his decision for GO.

QUERY Is this a - -

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QUERY - is this a GO for all three crewmen?

HAWKINS All three crewmen.

QUERY They will be wearing masks when they meet with the President? I don't suppose though, the President will be wearing a mask.

HAWKINS Well, our plan is not to put a mask on the President. We do plan for the crews, as well as the primary contacts who accompany the crewmen, to have masks on, and certainly when they are within a two-meter distance, this is when the masks really become critical. Now it is possible that you might see pictures of where the crew is in the vicinity of the President without a mask on, but this will be - they will be protected by placing them upwind and - you know, in a manner where - and away from the two-meter distance and all this type of thing. So we've got all kinds of ways (laughter) of coping with our problems.

PAC John Wilford.

QUERY To what do you attribute this rather rapid turnaround in their condition? Does this indicate to you that perhaps you weren't seeing really deep-down deconditioning, but just some very transient things?

HAWKINS I think there were very definite changes here. And I don't know how, you know, how deep-down - deep-down really means. They were definite, they were positive findings, both in the vestibular and the cardiovascular area. I think that the symptoms that we were seeing in Joe were more vestibular than they were cardiovascular. And I think the results of today's tests are going to bear that out. I think even the initial picture this morning tends to bear that out. But they are positive findings. Now the time over which they readapt, and that's what they're doing now I really think, is a readaptive process going on here to prepare them to live again within the 1-g environment.

QUERY Do you have any preliminary results on the gamma ray bone scans and the blood chemistry and things like that.

HAWKINS No, I don't at this point. I haven't received any data on that.

PAO Mary.

QUERY Dr. Hawkins, do you have any figures or can you tell us generally how each of the three crewmen compared in this morning's runs to, say, preflight and also their orbital stuff? You said Kerwin went through the lower body negative pressure thing, but I mean like blood pressure and that kind of stuff, how did he compare and so forth. And also, what about the orthostatic hypotension, is that all gone or fading, or what level?

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HAWKINS Yes, to answer the last part, we have not seen any of the fainting or presyncable symptoms of orthostatic hypotension today. He is moving about, he's climbing stairs on his own without any assistance, whatsoever. So I don't think that we're - I think that we're over that phase of the problem. Now the only thing we've completed was Joe's M092, and I do not have as yet, any results on the others. This is being done now, and it will be this afternoon late before we really get any of that data back.

QUERY What was his - how did his blood pressure and pulse compare during that run?

HAWKINS Okay, it compared very favorably with what his inflight measurements were. I was looking to see if I had written down the exact figures on that, and I didn't, Mary. He - you remember we were running him at 30 40/40 inflight and he today, this morning, those values were just about comparable with the inflight.

QUERY Still show, because I did show - -

END OF TAPE

QUERY - - cause I did show an orbit - in orbit deconditioning. So it still shows a deconditioning as such.

HAWKINS Not significantly except for the fact that preflight he went to minus 50. Now, that's that's really the difference that were yet looking at and I think really by tomorrow we ought to be able to see him perform the minus 50 level.

QUERY I have just one more. Now how do you feel about the 56 day flight?

HAWKINS I feel very confident at this time that we can proceed and fly a 56 day mission.

PAO Art Lord, NBC.

QUERY Now that you've had another 14 hours or so to look at the problem, could you sort of recap for us what you think the problem with Dr. Kerwin was? In laymens terms, and also the causes for it, if you will.

HAWKINS Well, I think I talked about this at one of the - one of the a weekly medical briefings that we had during the mission. As an explanation of what we saw in flight, with the - with the vestibular studies. And - and that a - that here again, this is still kind of a theory, but I feel that the - in flight that we saw the - the absence of the influence of the otolith within the semicircular canales, which tend to put a dampner on influence upon impulses originating within semicircular canales that are fed into the central nervous system. And that a with the release of this a - governor or influencer on those impluses they were able to respond in a manor which we saw them. In other words, the symptoms of - that generated from excessive acceleration and, that type of force are relieved. Now, as I put together, in my views then, under return to gravity and the otolith, which are the gravity dependent and their action, then become again active and could very well tend to - either - the results in all that your seeing then from movements and acceleration and all in flow of the fluids within the semicircular canals could there-for be amplified in such a manner that the symptoms of nausea, vomiting and all that go along with motion sickness. Would be paramount at much lower level, much - in other words the treshold has changed, and they have to go through a re-adaptive process in - to regain what was normal for them, before the mission. Now I don't know if that helps to clarify it any for you at all. But that's kind of my ideal of the type of - of situation that were dealing with.

QUERY Do you have any reason to believe that this condition could get worse, are the recovery process might be longer, in a 56 day mission as opposed to a 28 day mission?

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HAWKINS I think that the - I think that the - were going to see individual differences. And here again I think - I think it's going to be alot upon the particular individuals normal vestibular physiology just as on the ground, you find some people that a - get sick riding in the back seat of a car, a child gets sick riding on a swing, and their highly susceptible a here again I think were going to find some crewmen are going to be more susceptible than others. Now what the - what the longer duration, exposure for a longer during is going to cause whether - you know whether it's going to - that - influence the return period. Any, greater than what we've see here, I can't say, and nobody can really, I guess that's something we're going to have to learn as we get in to the - move into the 56 day phase. And here again you're going to be dealing with three different individuals again, and it's possible that you may see similar occurrence in one of those men or all of them, and you may not see any in any of them. That's really about the best that I can answer.

QUERY Is it possible that the movements of the ship aggravated the vestibular problems in Kerwin?

HAWKINS This is possible too. And I think that - you see all of this really started while they were still on the seas surface in the command module. And I think that the - yes - I think that you have a little bit of the motion sickness, sea sickness type of thing that entered into the initial phases of it also.

QUERY And, how do you feel about the validity of those vestibular function test the preflight and during flight? Since they really didn't seam to pick out these differences that happend afterwards.

HAWKINS Will, I don't really yet know, what to say to that. Because that's what we're trying to learn are what is the - the predictive value of the test that you - that you can do. We may find it okay, we may find we need to do other type of testing, to go beyond where we are. So we're learning, we're on a frontier really.

PAO Carlyn Kenith Calihad.

QUERY Do you have information that goes back to their childhood, to say whether these fellows were the type to that do get sick in the car, and that sort of thing?

HAWKINS I've - we've - yes we've looked at all that and I can't honestly say that I can detect any - any significant findings back in childhood that would give you any clues to the fact that they would respond this way.

PAO Chris.

QUERY Doctor, did you actually talk to any of the three astronauts, or did you talk just to Dr. Ross?

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HAWKINS No, I've only talked to Dr. Ross and Dr. Herdensky, Dr. Johnson who's out there. But I have not talked to the crews themselves.

QUERY In the LBMP, did the calf size changes, the delta change increase any recently are did - More than it was in flight?

HAWKINS No, I tell you what they gave me last night was that volumn percent changes which doesn't really give me the sonometer circumference and all. And I meant to clarify that this morning too when I was talking to them and I forgot that point. But, I will get it tonight. I want to know is exactly what those - what those sonometer measurements are. But what they were reporting which is the way the PI normally reports the data is in a volumn percent change. Now, inflight we were seeing, under the positive, or the negative pressure loads, something like a 4 to 6 percent change, maximum volumn change, in the leg. Now, in postflight, then, to give you a comparison, they were talking about 1.6 to 1.9 percent volumn change. So there's a definite difference during the actual test as to the amount of pooling that's occuring.

QUERY Did they do some addition LMBP this morning or - since they awaken?

HAWKINS On Joe Kerwin, is the only one that - had been accomplished today, when I talked with him.

PAO Mary Boules.

HAWKINS We had not gotten into the other two.

QUERY Dr. Hawkins, how - how do you resolve the fact, that in their whirling chair thing they were able to sort of double the runs and they didn't show any dizziness, and yet like, we had Schweickart, who got ill, nauseated in orbit, and we had some other symptoms, you know before, plus the Russians experience. And yet, you know, you come back, and you have this great amount? How do you resolve that, that Kerwin himself, went through this great thing yet, you have the background of Schweickart and these others that, you know, just under normal weightlessness have had problems?

HAWKINS Well, Mary, again I think you're - I think you're dealing with some individual variances. Rusty, was one who definitely responded to - very early and over a long period of time in flight to the changes in zero gravity and his threshold level was definitely lower, then some of the other crewmen have been. I think that a - let's see - I was trying to think what the - now inflight see, really Paul, and Joe both performed identically, really, they were they were both able to work up to the -

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HAWKINS They were both able to work up to the maximum excellerations. We doubled - actually doubled their excelleration rates under which they were undergoing the head movements to test the motion sensitivity. Now, post flight, Joe has as they have all shown some degree, and again there's individual differences here in the three men, but they have definitely all shown the similar same type of - of vestibular phenomenon. Now Joe's has - is more severe, and it is taking him a longer time to readapt and regain his original threshold values.

QUERY Dr. Ker - Dr. Hawkins, what did they have to eat today? What was on their menu?

HAWKINS Oh, boy I don't have that menu in front of me. I can't answer that for you right off.

QUERY Do you know what day in the cycle they're on, food day?

HAWKINS Well, this is R plus 1.

QUERY Yeah, but in the six day cycle is it day one or two?

HAWKINS I don't know.

QUERY Could you find that out?

HAWKINS I haven't really kept up with it that close, I sorry.

QUERY Would they have to forego any refreshments at the President's San Clemente home? Stay on the test.

HAWKINS They're going to be limited to what they can - what they can eat and drink. It's something like coffee or tea or some like beverage, but they will have to restrict their intake because of the - that nutritional mineral balance study.

QUERY Can you tell me what food they brought back for sampling? And when will it be here?

HAWKINS It would come - it will come back with the - I believe we will get all of those samples back with the crew as they return Sunday night. And - and again, I'm sorry I don't have the list of all those food items that we've asked for in return I just don't recall each one of them. I can get that for you though, if you'd like to have it.

QUERY Dr. Hawkins did I hear you correctly a few minutes ago? You referred to this ailment of Kerwin's as a vesbibular phenomenon.

HAWKINS Well, yeah that's what I said. It's a - it is vestibular in -

QUERY (garble)

HAWKINS Right.

PAO Okay, any further questions? Carolyn.

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QUERY - - know what the latest word on the refrigeration problem is, and what is that going to do to Carolyn Leech's experiment?

HAWKINS (laughter) I can see I didn't come over too well prepared this morning. The temperatures, I heard - Ted probably knows more about that than I do.

PAO I stopped by to talk to Chuck Lewis over there and the refrigeration system is slowly improving. There's a trend toward improvement in the temperatures. There's one sensor there that is now minus 5. something degrees and they're looking for 15 degrees below, and it's gradually coming down at each station pass. And internal temperatures are in the high 70 and low 80's, sort of fluctuating back and forth in the workshop atmosphere, and it's depressurized to two pounds right now. And the momentum is stabulized, the gyros are performing okay for the time being. Current orbit is 231.9 by 240.1 nautical. And they've opened the S149 door to start gathering contamination data, and that's about all I know about the health of the workshop.

HAWKINS Do they know why the - any idea yet what the cause of that was?

PAO The refrigeration? No, I don't think they are sure why it happened.

QUERY Does anybody know if the wives have been invited to meet with the President?

HAWKINS Not, not - no. I feel I can answer that affirmatively no. Yes, I don't know. (laughter) No, to my knowledge they have not been invited out there. They will see their husbands here at Ellington Sunday night.

QUERY Do we have any kind of a time table yet as they are going to San Clemente?

HAWKINS When they will go? It's tomorrow morning - I think they're to be there at 9 o'clock.

QUERY Be there?

HAWKINS I believe that is correct. California time.

QUERY Nine our time?

HAWKINS No, their time.

PAO Pacific daylight.

HAWKINS Yes, two hours difference. It's - the whole trip will take about four hours. There's an hour - something like an hour flying time. They'll be there for an hour and a half, two hours, another hours flight back and to the ship. That's about the time.

QUERY (garble)

HAWKINS I can't say. I don't personally know.

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I had the idea that he was.

QUERY (garble) the President's - -

HAWKINS Yeah, (garble)

QUERY It was my understanding resently that he was Kary, but I don't know. I too like you heard that there was a possibility he wouldn't.

PAO Okay, no further questions, we'll shut it down. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
HOUSTON, TEXAS

CRF MEDICAL STATUS BRIEFING
JOHNSON SPACE CENTER
JUNE 22, 1973
10:40 P.M. CDT

Participants:

Dr. W. Royce Hawkins, Deputy Director for Medical Operations, JSC
Don Green, PAO

SL-II PC-74A/1
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PAO Okay, gentlemen. We are ready to start this medical status report. And, of course, as you well know, on my right is Dr. Royce Hawkins, who will be talking to you - explaining what has transpired over the last few hours with the - with reference to the Skylab crew. Dr. Hawkins?

HAWKINS Okay, let me - let me - first apologize to all of you. I realize that this thing was set up earlier. It was based upon some early predictions as to what time things on the ship would be squared away. And it just hasn't worked out that way. They got behind in their timeline on the ship, and, so, the delays have just been unavoidable, really. I'm sorry for any inconvenience that this has caused any of you, but we did have a rather lengthy - conversation with the ship. The comm was a little bit bad at times and we had to go back and repeat some of the material so that we felt that we - we were understanding exactly what information was being transmitted. And, so - anyway, now I think that I do have a fairly up-to-date report for you on exactly what our situation is with the crew on the ship. Now, as all of you are aware of, they came aboard in the spacecraft this morning, and they all looked rather wobbley and unsteady when they got out of the spacecraft and standing on a platform. They did feel some unsteadiness, and this - actually - well, really, the symptoms of - began to appear first with the - the entry. Where they were - commented that they were very much aware of the increased g's of entry - although this is no big problem to them. They were cognizant that there were a lot of g-loads there, which they would interpret as being a little greater than the 4-g's which they were pulling. Nobody had any adverse effects from this at all. It carried on over into when they were aboard the ship. They did state that they felt like they were very heavy and they kind of related this to - like - like about a 2-g load on them. This gradually faded out. That was their initial reactions I think, to getting back on the Earth. Now, they - all three crewmen did experience some vestibular disturbances which we have talked about on two or three occasions I know of, as a possibility that - that we would see this when the crew returned. And, all three did experience this - this in the form of dizziness, and light-headedness, even some - stomach-awareness - even in - and Kerwin, to the point of some nausea. Now, Kerwin has, by far, felt more effects of this, than the other two crewmen. And, he is the only one who decided to inflate the capstands in the counter-measured garment which he was wearing - they were all three wearing. But, he felt unsteady enough that he elected to go ahead and inflate the capstands and wear the pressure suit on exit from the spacecraft. The other two did not feel that they needed

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the coup'ar-measured garments inflated, and they did not inflate them. So, they proceeded on then, from the spacecraft to the laboratories where the examinations have begun. The - the Commander - let me state here, the Commander's - dizziness and vestibular disturbances have persisted in - I'd say about two-hour period before he felt that things were quite stable for him. Now, to go and complete his protocol, that we ran him on, he - he showed in his lower body negative pressure, that he was well within the guidelines and all of the preflight base-line measurements. He was able to complete the - the entire - series of runs and through the max-stress level of minus 50 millimeters lower body negative pressure. You will recall that he was the only one inflight who was able to do this, and never had any problems with the LBNP tests. So, in the post-flight period, I don't think it's it's - really unusual here to expect that he might be able to do the same thing, and he did. His - his M171, the bicycle ergometry, - here again he was able to work through the entire profile, and his heart rates, blood pressures, were right in the - again - right in the envelope that we saw preflight and in the - in the inflight measurements. Now, we did see - as some - again, some PVCs, premature ventricular contractions. There were - there were several of these that were noted in the - again in his second work level, and you might - might recall here, that we did see some of these in his first bicycle ergometry run inflight. Here again, let me say that the - what we saw there was nothing alarming and nothing that I would be concerned about at all. Okay, the - his laboratory work - looked as to be very well within the normal range. And I see nothing out of line there. All right, now - Paul Weitz - he commented that on entry he was very, very much aware, of course, of the reloading - he found it - he found it difficult to move his head up off of the couch. Although this was - I don't think too unusual to find that condition. He did, also, experience the - the dizziness - and or - vertigo type of symptom on movement of his head, just like the other two crewmen did. In his lower body negative pressure tests, - let me recap for you inflight. We had to terminate his fifth run because of presinkable symptoms that developed , and from that point on he ran at a minus 30, minus 40, minus 40 level. Okay. Interesting enough, - in the post flight - lower body negative pressure tests, he was able to complete the max load of minus 50 millimeters of negative pressure without any symptoms. So, you might say that was slight improvement. Now, on his M171, the bicycle ergometer tests - -

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SPEAKER On his M171, the bicycle ergometer test, he completed all of the work levels and had no problems until in the recovery phase, he did have a sudden drop in his blood pressure, from 190 systolic down to 143, that was rather abrupt, and simultaneous with that, a drop in he rt rate which resulted in some nausea and some dizziness and he did experience some feeling of illness at that point from the, during this rest phase. Now, he was immediately stretched out and recovered within the 5 minute rest period and felt all right again on arising. Now, again, his laboratory work was well within a nominal range. Now, on Joe, Joe has really not fared as well as the other two crewmen. He has demonstrated more of the vestibular type disturbance, the dizziness and all and associated nausea and the feeling of weakness. Now he was wearing the capstan pressure suit and because of this, then we had to make him do a modification of his test protocol, where he would do a stand up test, and then - before going to the LB&P test, so we did some supine measurements and then a standup with pressure suit inflated, then we laid him down, unflated and stood him up and got the differences there. Now, at that point he seemed to be doing pretty well, following that standup test, and therefore preceded to do the LB&P, which was the next test to be performed. Now, he was not able to complete the test. He measured - he made it through the minus 30 level, but in the first minus 40 level, we had to terminate that after 3 minutes and 50 seconds. We were not able to complete the 5 minute period and this was again, because of a slowing of his heart rate and drop in pressure with- but actually not really experiencing any true presymptible symptoms. But the run was terminated and because of his reaction, his cardial vascular status at this time, it was decided that we would not proceed to do the lower body - the bicycle ergometry test, and this was not performed on Dr. Kerwin. Now, his laboratory work looked again, like the other crewmen. Looks very normal. Body weights, the commander lost - shows a loss of 3 and 3/4 pounds. The Science Pilot 6-1/2 pounds, the pilot 8-1/4 pounds. Okay.

PAO Okay. We're ready to take questions. John?

QUERY Well then, how generally would you evaluate their health? Would you say they're in fairly good shape, marginal shape, or what?

SPEAKER Well, I think, actually, as far as Pete and Paul, I don't classify them in any way, form, or fashion to be in any ill health. As I say, Pete's - he seemed to bounce back after about 2 hours and was very active and moving around quite a bit on the ship. Paul was longer in getting

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over those initial vestibular symptoms and it was like - something like 7 or 8 hours before he really actually got to a point where he was able to move around and freely move his head without setting off that feeling of nausea and dizziness. And he did proceed to go walking, exercising around the ship. Now, coming back from that he did feel tired and he did complain of some muscular soreness and he has gone, well, they've all gone to bed, but he went on and proceeded to lie down and rest. Now, Joe was, as I said, was really the worst of the three as far as the symptoms go. He was able to, by his own assistance, to get up the stairs, but, he was accompanied and assisted to the third level of the flight up to their quarters and Joe, actually, he really did not feel at any time as yet that he was ready to get up and move around like the other two crewmen. Now he has had a slower recovery and a slower adaptive period here, that he is going through, than the other two. And it's - he had - we saw more changes - more marked changes in flight with Joe, and I don't think that this is really anything different than what we would expect because of those findings. But he is slower and his adaptation is not yet back to normal. And we're going to see that he is going to be slower in returning.

QUERY Do they seem to be in worst shape than you had expected, or better shape? And do you believe that that'll be able to go to San Clemente?

SPEAKER Well, I think actually, to answer the first part of that. I'm a little surprised, you know, that Pete looks really as good as he does. I expected him to show a little bit more of this. I think I'm a little surprised that Joe is showing as much of this as he is. They're - I guess I would think that I would expect them to be a little bit more like Paul Weitz in the way he is responding. But they're individuals and there are individual variances here that we're looking at, and that's the way you've got to - you know, you've just got to understand and expect you're going to see individual differences. Now, as of this moment, I would say that I do not forsee any problem with Pete or even Paul making the trip to San Clemente. I cannot say at this point that Joe is going to be ready that quick or not. That we'll have to wait and see.

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SPEAKER - - to be ready that quick or not. That we'll have to wait and see. And the results of his tests tomorrow would very definitely, I think, give us the answer to that. I think with a good night's sleep and all that we're going to see termendous improvements in all of them and certainly in Joe by tomorrow. Let me say on that point there, that the crew the night before really did not have a very good night's sleep and joe's was about four hours of very fitfull, restless type sleep. Paul Weitz reports really only one good hour of sleep and Pete's was about 4 or 5 hours of sleep.

QUERY Well, considering that and a very long arduous day asleep an aircraft carrier which they're not used to, would you as a peronsla physician recommend travel by helicopter off the ship, to a visit to San Clemente, back to the helicopter.

SPEAKER Well, Jim, only if they show some further improvement. Yes, I do. I do expect it. I - as I said, at this moment, I really feel there will be no question about Paul or Pete. At this moment, I do have yet some reservations about Joe.

PAO Tom O'Toole.

QUERY Do you see anything - you don't see anything that would give you a GO for 56 days on Skylab 3, do you?

SPEAKER Tom, no, not at this moment. No. Now, here again, we've got to wait until we've got all of these inflight samples back into the laboratory where we get a look at the - some of the basic cellular and enzyme in biochemistry levels to to understand more of the type of gross physiological changes that we've been looking at.

PAO Let's go to Nick Chris. No, right here.

QUERY Was there any sort of vomiting associated with this nausea.

SPEAKER Yes, there was. With Joe Kerwin - only him. This was after he had arrived in the laboratory and had - well, he was seated and they had some grape juice drink and he drank this down - I think rather as he described it - chug-a-lugged it down and it was immediately after this that he felt neasea and did vomit and the grape juice itself. I don't know whether - I don't know what the temperature of that drink was - whether that enetere into it. It could have - his cold could very well - it could very well have participated it. But anyway with the dizziness and the nausea that he'd been having you could certainly expect that this would - that this could possibly - be - occurred.

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SPEAKER That's the only time it did happen.

QUERY Was there anything in Kerwin's preflight medical data that would have indicated or predicted that he would have been effected worse than the other two.

SPEAKER No, no, not really. Because in the only preflight baseline measurements, they were able to complete all of the program for - all the protocol that - and just like they started off with the LBNP - okay, he was working right up through the minus 50's just like all three crewmen were and their exercise - bicycle ergometer workloads were certainly nominal. Their response to the rotating chair in the preflight period were certainly nominal.

QUERY What arrangements do you have in mind for maintaining quarantine during the Presidencial visit.

SPEAKER Okay. We have a - we have a health stabilization program that was written prior to the fligt which does cofer the postflight period. Now this does allow for a - some contingency operation where you would expect to have to bring in someone you previously hadn't expected or anticipated and you didn't have time to get them through rigid physical examines and that kind of stuff. So - where we run into that situation, the program calls for the use of surgical masks and thee masks will be worn and they can be worn either by the crewmen or they can be worn by the people that they're coming in contact with.

QUERY Did inflight - did any of Noe's LBNP have to be terminated?

SPEAKER Which - which - LBNP you said?

QUERY Right.

SPEAKER Yes, yes. Right, right. Twice we had to terminate him.

QUERY At what levels?

SPEAKER Okay. He started off with the 30, 40, 50. Okay. We worked through that fine until his third run and he developed some pncsyncope symptoms in the - at that max load on his third run. Okay. We terminated that one, cut him back then to a 30, 40, 40 for the rest of the mission. He did fine with that until the last test. The alst run he made and he again demonstrated some presyncable symptoms. At the - again at the second 40 level. And it was terminated at - after - let's see how many - after I think it's sever minutes. So he's short about 3 minutes of his last run.

QUERY But at that time, when you terminated the LBNP, the M171 was run anyway, was it not.

SPEAKER Then how much more serious was it today when he could not complete it at the levels - why not go with the M171 - doesn't that just kill all your postflight data by not getting a first run on M171?

SPEAKER Well, here again now - let's look at it. Inflight data - they were not having any problems with doing that 171. They were - they were doing far better than they ever did in their baseline. Okay. And the postflight, now, - the postflight - now, we saw some differences here. Paul Weitz developed - went into some syncope - presyncope and nausea - on the termination of that 171 run. Okay. Joe's response to the LBNP was worse than the other two and he was still having problem with - just standing at that point, see. This is why - he was still wearing the countermeasure garment to help him and give him some support during this early period. And it was just - it was just decided strictly upon clinical judgement that he would not be subjected to it at that time. I think - I don't think he would have been able to have completed it or even gotten into the first level of work probably.

QUERY Did anybody - did any of the crewmen faint?

SPEAKER No there was none of them that actually fainted. No.

PAO Mary Bubb.

QUERY It would seem to me, from what I can recall of earlier flights that even Weitz was in far worse shape postflight due to this condition than any of the other previous astronauts from what I can - is that true?

SPEAKER Wait a minute, Mary. I'm not sure I understand what you're saying. You're saying that Paul Weitz looked worse than the others.

QUERY No, no. I mean Weitz - just take Weitz for one example. It seemed to me that he was in worse shape than previous astronauts had been in postflight. From the deconditioning.

SPEAKER Actually - if you look at his immediate postflight LBNP, he looks better. Now he did respond differently on his - on the workload exercise. Although he was able to complete the entire work profile, he did suffer some ill effects there in the immediate recovery period.

QUERY Well, he also had that onboard ship on the Apollo, didn't he, too.?

SPEAKER Weitz - not Weitz. He's never flown before.

QUERY No, I'm talking about comparative data you've gotten on other astronauts at following other flights.

SPEAKER Well, let's see. I don't - we have seen - in most every crew - every crewmen that has flown in Apollo, we've seen a degradation in their work performance in the immediate postflight period. Now, I think perhaps the - I don't recall any that suffered these particular symptoms that

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Paul exhibits here in the recovery phase. But nearly every one has had some degradation in this work performance and - -

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HAWKINS - but nearly every one has had this - has had some degradati n in this work performance, and has been 48 to 72 hours, some of them a little bit longer, in returning.

QUERY How would you evaluate his level? On a par or a little worse, or what? I'm talking just about Weitz before we - -

HAWKINS Well, I think his - as he was working, I think he was on par, but he did - he did develop these symptoms in his recovery phase, which is a little bit different than we've seen in the past. Yes?

QUERY On Kerwin, himself, wouldn't you consider this fairly serious? How would you evaluate his sickness?

HAWKINS Kerwin's?

QUERY Yes.

HAWKINS Well, we have never yet seen any that - exactly like - like Kerwin's - that's true - he is really, I think, slower, by far than any that we have seen.

QUERY Well, for example, could you give more detail - like how long did he wear this pressure garment? How much of a examin did you do on him?

HAWKINS Well, we - -

QUERY And, how badly did he feel by the time he went to bed compared to when he first - -

HAWKINS All right. He wore it for a period of 7 hours. Now, this was - this was intermittent, and it - because he was still - he was still having some of this symptom of dizziness, and weakness, and he - he would wear this garment inbetween the examinations in order to give him some counter-measure, and - and - assist him as he would be moving from one lab to the other. He wore it to his quarters, and a - he did not, as such, when certainly was not in any real condition to get out and roam around the decks as the other two crewmen were.

QUERY Two quick ones. I wasn't clear as to whether this dizziness and problems they were having is due to vestibular problems or due to hypotension or - -

HAWKINS Well, it's - yeah, that's the thing which we're trying to really sort out, too. I'd - I'm not sure. You know, how much of which is - we're really dealing with yet. I think we're dealing with more of vestibular at the moment, than - there is definitely some cardiovascular response here, too.

QUERY Secondly, do you have the blood pressure and heart-rate readings on Kerwin - as they stood up with and without the garment?

HAWKINS No, as a matter of fact, I don't. And I have - for some reason I didn't copy those things down here.

Well - -

PAO We'll try to get some for you.

HAWKINS Yes. Okay.

PAO Now, and Abbey, I'll get you next.

QUERY Doctor, do you see anything yet from any of the tests you've made that would indicate any sort of permanent disability or impairment on any part of any crewman?

HAWKINS No, I don't see anything like that at all. And I don't - and I - there's - really what we're seeing - is - in no way whatsoever, I think is of a - major significance as far as the crew's immediate welfare is concerned, or certainly, with regards to any - any potential residual effects is concerned. Not at all.

QUERY What were the postflight calf measurements? How much have they lost over the whole flight?

HAWKINS Well, Abbey, the - the measurements are just about the same as they were in the last - the last inflight measurements. Now, the changes in the Deltas during the LBNP, are not as great. We're in the - in the immediate postflight period. Like they were getting about a - a 6 percent - 4 to 6 percent Delta in the - during the - the stress tests inflight. They were measuring 1 to 2 percent Deltas in the recovery phase.

QUERY ...

HAWKINS Yeah, the measurement - the actual - the actual resting circumference is about the same.

QUERY Doctor, on the June 5th two status reports stated that medical problems exsist which precludes making an EVA on Thursday. I don't remember anything like that ever being discussed, and were those permanent medical problems and what is that all about?

HAWKINS I never made that statement. That's a mis-quote.

QUERY Well, it's in this report.

HAWKINS Which report?

QUERY It says right here - -

HAWKINS Yeah, I saw it too, but I didn't say that.

QUERY Well, do you know who did did say it?

HAWKINS I don't know.

QUERY Do you know where it came from?

HAWKINS No, because we didn't say that.

PAO Jim Maloney.

QUERY A couple of things. It appears - -

HAWKINS I don't honestly know.

QUERY You're aware of this then?

HAWKINS I read it, but - the next day, but I didn't say that. We said that there were no medical problems which would preclude the EVA. I think there was some words left out of that.

QUERY It appears to be so, but I'd like to ask you. Is this crew in the worse condition of any you've seen?

HAWKINS Jim, I think the - certainly not with Pete. I don't think you can say that about him. I think - yes, I think Joe's - symptomatology here, is of - greater than what we have seen. It's a little more advance degree than what we've seen, but it - both with the - certainly with the vestibular aspects of this, and also with the - with the cardiovascular.

QUERY Well, what was your medical opinion be about - would it have been better to have Joe carried off?

HAWKINS Oh, you could - you could - I guess you - at that point you could probably say - toss the coin. Now, with the counter-measure garment, this did prove - to be a very effective device which - which did give him the support and all that he needed and he was able to walk. And, now, certainly you could - you could have put him on the stretcher and carried him out just as easily, and it's been certainly a lot less effort on his part, but I don't think that his walking under those conditions - you know, adversly effected him.

QUERY Who will make the medical judgement about going to San Clementi, and when?

HAWKINS Well, Jim, right now, it's - with regards to all of the crewmen, I think it's - you know I think it's still a little bit early to say positively that any of them will be ready to go. I want to reserve that until we have a look at them tomorrow at R plus 1. And certainly, we have to - we have to hold the - any type of a decision concerning Dr. Kerwin at this point, until we see something more tomorrow.

QUERY Yes, but who will say?

HAWKINS Who will say that? Well, it will be - it'll be a joint medical opinion.

HAWKINS Of the medical staff here at MSC - will make that decision.

QUERY Not Dr. Berry's say?

HAWKINS Not Dr. Berry alone. He will certainly be - he will certainly be in the - in the loop on this, as he has been throughout the mission.

QUERY Will it be purely a medical decision?

HAWKINS From this standpoint it will be. Yes.

PAO All right, let's take two more. Jerry?

QUERY What was the lab work that you said was normal? Was that - you said the lab work on all three of them

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was normal. exactly what was the lab - -

HAWKINS	The lab work? What are you - you're not asking for figures on that?

QUERY	No, that's what - -

HAWKINS	Yes, they ran the - yeah, okay, the - like the blood counts - and the chemistries - -

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SPEAKER The blood counts and chemistries and blood chemistries, the urines, these are the immediate things that were done on the lab. Now there will be some well, I said chemistries, not all of those either, because those take time, and there will be a delay in getting some of those answers out of it. But primarily your quick look stuff, like your hemotology, urinalysis, and white count, red blood cells, differences.

PAO One last question from Mary.

QUERY Dr. Hawkins, some time ago, I think before this mission, there's always been some concern that after prolonged weightlessness, man will come back, he'll run into this kind of thing and will become unconcious, and he will be unable to perform. Now, how do you feel about this in view of what has happened to Kerwin, and what will you recommend for the future? And I'd also like to reask that question about will you go ahead and recommend the 56 days based on what you know now?

SPEAKER Well, Mary, at this point I don't have anything to base a recommendation not to go 56 days. I think the performance that we have seen in the crew during the mission itself states that they could have gone longer in flight. The post flight results we've got here, three different reactions. Three different responses and I feel confident that Joe, as well as Paul and Pete will all bounce back to their pre-flight baseline levels, just as we have seen previous crews do. It's quite possible that Joe may be a little longer in this readaptive phase than what is usually seen. It wouldn't surprise me but what he's a little longer, but I have no doubts but what he's coming back, and every hour, I think he's moving back into that baseline envelope.

PAO All right. Thank you very much.

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SKYLAB NEWS CENTER
Houston, Texas

NASA Management Postmission Press Conference
Johnson Space Center
June 22, 1973
11:46 a.m. CDT

Participants:

Dr. James Fletcher, NASA Administrator
Dr. George Low, NASA Deputy Administrator
Mr. Dale Myers, Associate Administrator for Manned Space Flight
Dr. Christopher Kraft, Director, Johnson Space Center
Dr. Rocco Petrone, Director, Marshall Space Flight Center
Dr. Kurt Debus, Director, Kennedy Space Center
John Donnelly, Asst. Administrator for Public Affairs

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PAO - - two briefings this morning. The first being what we call the management press briefing, which we have Dr. Fletcher, NASA Administrator, Dr. George Low, Deputy Administrator, Mr. Dale Myers, Associate Administrator for Manned Space Flight, Dr - - What order are we in here? Dr. Debus of JSC - KSC, Dr. Kraft and Dr. Petrone. What I would suggest that you do is hold your basically operational type of questions until the second portion of the program in which we'll have the Skylab Program Director - Program Manager doctors and others. We'll begin with a brief opening statement by Dr. Fletcher, and then move directly into your questions.

FLETCHER Well, needless to say we're all very pleased and excited that the SL-II crew has arrived safely. It was a spectacular recovery, one of the best and one of the smoothest. In addition to that, I think it's another very historic milestone in the history of manned spaceflight for the first time a crew of astronauts has returned from an extended tour in a space laboratory. And as near as we can tell, essentially all of the objectives that were anticipated for this mission have been completed. And needless to say none of us really dreamed that this could be done at the time that the meteoroid shield failed to deploy. So it exceeded our wildest expectations at that time. I think before going much further I ought to read a message from the President which you may have already. It reads as follows: It's addressed to astronauts Conrad, Kerwin and Weitz. "The successful completion of the first mission of Skylab is a source of intense pride for the American people. You have demonstrated that just as man can conquer the elements of Earth he can cope with the exigencies of space. You have given conclusive evidence that even with the most advanced scientific and technological support in the world, the courage and resourcefullnss of good men are still central to the success of the human adventure. On behalf of the American people I welcome you home from the Skylab spaceship to spaceship Earth. I also looked forward to seeing you in San Clemente on Sunday." Now, whereas the last three Apollo missions might be symbolized by a Lunar Rover, this SL-II mission can be simulized - symbolized by a hammer. And this is a - this is it, this is the hammer that fixed the battery - replica of it. A hammer, a pair of pruning shears, and this is an exact replica of the pruning shears, and an umbrella. And this isn't a precise replica of the umbrella but that's - that's the thing that first saved the Skylab from burning up essentially. The shears are what saved the - the second

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solar panel and gave us the excess capacity, and the hammer was a bonus. We got 250 watts extra by simply tapping in the usual good old-fashioned American tradition, tapping on the right place and opening - or make a relay function. So I would say that if these people were to be characterised in one word, it's in the old American tradition of tinkering. They are the master tinkers of space. With that we'll open for questions.

QUERY All outstanding and commendable, it looks like the problem with the refrigeration system may be something a little beyond the scope of a hammer, but of course, that remains to be determined. Do all of these malfunctions indicate any kind of lapse in quality control at any point in the system?

FLETCHER I'd like to turn to Dale Myers to answer that question. Dale.

PAO Dale, could you repeat the question in part? I don't think we're getting enough juice there.

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FLETHER I'd like to turn to Dale Myers to answer that question. Dale.

PAO Dale, could you repeat the question in part? I don't think we're getting enough juice, there.

MYERS The question is; Were the malfunctions an indication of lack of quality control? I think the answer is absolutely no. We have had a major complex system put together here for this flight. And it is a first flight. And we had expected some problems particularly in the eight month mission that we had ahead of us. And when we look at all of the elements of the systems that have worked perfectly, I don't think there's any indication here of any decrease in our quality control requirements in the program.

QUERY Dr. Fletcher, could you estimate the affect upon NASA's budget on the problems and the fixes that have gone - that the Skylab has gone through?

FLETCHER Despite the fact that there was a huge effort, within NASA and within our contractors to make these fixes, I don't see any major impact if any at all on the budget at the present time. Now that doesn't mean that we don't - won't run into any other troubles later and so forth. But at this time, I don't see any major impact of these fixes on NASA's budget picture.

QUERY You mentioned that these astronauts are going to be San Clemente. Do you have any more details on what kind of reception they are going to have there?

FLETCHER Well, the President has invited them to stop by San Clemente, Sunday morning, to visit with him and Secretary Brezhnev. We of course, have to ascertain the health of the crew, before we actually allow them to make this visit. But, if their health is good, and we will know by about tomorrow noon a lot more than we know now. Although, we have a pretty good idea that they're in good shape now. Then, probably, they will drop by as the President requested.

QUERY Could someone bring us up to date on the study or investigation concerning what happened to the micromeoroid shield? Are there any new theories, could we expect anything within the next couple of weeks?

FLETCHER Well, actually we can speculate, at this time, about what happened. But I think it would be really unduly compromising the investigating board that was set up. The board was set up about 4 weeks ago, to look into this, and it's well underway, by now. And I think we'll just have to wait for the report of that board to

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really comment on something of that sort.

QUERY I have several questions, as usual. I would like to know the cause - the overall cause of all the delays and fixes, as best you know it today. I would also be interested in hearing your views on how much the fact that the heat-shield was not tested at the original plant as originally scheduled had on the accident which happened. What percentage overall of - the latest up-to-date figures, that is on the scientific objectives have been obtained to date?

MYERS Well, we have about the same number of people working on the program as we had at the time of the problem, perhaps even a little less. We've had a lot of overtime by a few people. And we see, in the overall Skylab Program, no change in the budget requirements. We're doing well as far as our budget is concerned. I guess, would you repeat the second question, please?

QUERY Well, way back when, it was my understanding that the heat-shield was not tested at the, you know, at the original plan, and in view of scheduling and time, at least the decision was made at that time to check it out in its deployment down at the Cape, and there was some speculation, that this might have had an impact on how thoroughly this was checked out and tested because - -

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QUERY - - down at the Cape. And there was some speculation that this might have had an impact on how thoroughly this was checked out and tested because the Cape facilities are not necessarily condusive to this type of testing.

SPEAKER The effect obviously will have to be something that the board will look into and give their opinion. I think in going in line with Dr. Fletcher earlier, we just don't want to compromise, we want to look at all of that. There was testing, however, done at the plant as well as Marshall, as well as Kennedy. Tests were done at all three places. Now whether there was any interaction and effect, the board is looking into that and will render a judgement.

QUERY The percentage of the scientific objectives that you feel - we had some figures the other day from one of the astronauts, but I'd like your up to date figures on it. How much we've actually achieved from scientific, you know, film data and all that kind of stuff?

SPEAKER (garble) will be on the next press conference, and I think he has those numbers as best as we now have them.

QUERY There is some confusion about whether the crew will be meeting with the President and Mr. Brezhnev. He was scheduled I believe to leave a couple of hours before they were to arrive. To the best of your knowlege, is he staying later to meet with them?

SPEAKER I rather doubt that the secretary would change his schedule for this. And if he is scheduled to leave earlier, then presumably the astronauts will meet only with the President.

QUERY This is for Dr Fletcher and or Chris Kraft. I know it is too early to nail down what the SL III is going to be exactly like. Are there any considerations underway at the present time to have any exrea EVAs to catch up with any experiments that might not have been able to been deployed in this mission or handled in this mission?

KRAFT No, not to my knowlege. We are trying to do some things that we might be able to modify some of the experiments that we were doing out of the scientific airlock. But other than that, we don't plan any other EVAs other than what we had originally planned, and that is three EVAs. One at the beginning, one in the middle and one at the end of SL III. If we need a hammer however, for use during those EVAs, we'll certainly take advantage of that time period. But there are no other ones planned other that that I know of.

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QUERY Dr. Kraft the crew was rather intensely critical of some of the flight planning and Mission Control operations from time to time. Of course a large part of this was part of their mission, to evaluate flight planning of - for real-time flight planning for long-duration missions. Do you think at any time they were excessively harsh, or do you think their criticisms were justified or was this just a necessary and desirable feed back?

KRAFT Well, I thought the interchange between the crew and the Mission Control Center was exactly as it should have been. They were criticising each other, trying to get the most out of the mission, and to make sure they both understood each other. I think initially when we had the power limitations that we were faced with it was a very difficult task to try to plan the flight plan around that power profile. And there was bound to be a difference of opinion on their part because we didn't know exactly what they might be able to do in certain time periods. For instance in the EREP passes, in trying to align the instruments. But once the power situation was worked out, then I think you saw that flight planning went extremely well. And if you will allow me, if I were to compare this flight with some others we had flown, I thought the cooperation between the ground and the crew was superb.

QUERY I wonder if someone could tell me what the latest thinking is on the launch of SL IV as to when it might take place?

SPEAKER As you know, we're talking about a - we've fixed the launch date of either the 27th or the 28th for SL III. That will be nailed down in the next week or so after we get a final track on the orbit of the workshop. SL IV is not nailed down yet, but we're looking - -

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SPEAKER - - final track on the orbit of the workshop. SL-IV is not nailed down yet, but we're looking in the mid to - middle of October to the end of October time period. We have some additional understanding in analysis of data to do before we nail that one.

PAO Was the question ready?

QUERY Two questions: first, in view of the possible presidential meeting, what's the best estimate on when the astronauts will arrive in Houston? And number two, how are preparations at the Cape going for SL-III?

SPEAKER Well, the best estimate that I can give you is the delta time required for the astronauts to go to and from San Clemente. If that turns out to be 4 hours, so to say, then they will be back in Houston at 9:15 on Sunday evening. And Dr. Debus can answer the second question.

DEBUS The preparations for the SL-III are going well. We are somewhat ahead of time so that we have ample margin for any contingency that could develop. So we are - we are well prepared for 27 or 28.

QUERY Question for Dr. Fletcher. The mission just completed has generally been interpreted as proof of the indispensability of man in space. Many things went wrong and they managed to fix many things. But at least one Senator on the hill, Frank Moss, has asked the crew to come down and talk to his Aeronautics and Space Committee. You expect you may be running into a gauntlet of senators who want to know about funding in the future and why so many things went wrong even if you did manage to fix them.

SPEAKER Well, I think quite the contrary. Senator Moss, I think, wants to see them because of the spectacular results of this last mission. And I think generally speaking the feeling in congress as far as I know it is very favorable toward NASA at the moment. Our bills are going through rather smoothly, and people that have been rather negative toward manned space have been at least quiet, or some even have changed their minds. So on the whole I would say Congress is quite pleased with the performance after the accident of the whole NASA organization, but particularly the crew having demonstrated what they could do in space.

QUERY Could I reflect on that a moment? You seem to hung up there, if you will on the fact that the crew was able to fix some things in the spacecraft as to the importance of man in space. I'd rather put that aside and say, "'Yes, that was very important." But I think if you will take a look at the experiments that have been conducted on this mission and the innerplay of man with the solar instruments,

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with the EREP experiments, and with a number of the other corollary experiments, you'll find that man was an extremely important part of making the experiments successful in Skylab. And I think that should be emphasized maybe more than the fact that we were able to fix a piece of hardware.

PAO Are there any other questions. I think we'll take one or two more and then yield to the operations people.

QUERY If the problem with the refrigeration - refrigerator-freezer can't be fixed. Right now they don't seem too terribly helpful, what impact will this have on the next two missions as far as the - particularly the medical experiments. I understand that's the area that will have the greatest impact.

SPEAKER Well, Mary, in the first place I have great confidence that they'll fix the - I think between the people at Marshall and other people involved here on the ground, that we're going to fix the refrigerator okay. But if in case we did not, there's only about 8 percent of the food that's remaining on board that is in the freezer. Those are the foods which are maybe the most appetizing because they're steak and lobster and ice cream, for instance. But as far as the actual nutritional value of the food on board and the conduct of the experiments, it would have little or no effect. I'm talking about the medical.

QUERY You know, you got to freeze your blood samples, your urine and all that kind of stuff.

SPEAKER Oh, yes, in that case we have some other techniques of using - pooling the urine, and you - -

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QUERY - - got to freeze your blood samples you urine, and all that kind of stuff?

SPEAKER Yes. In that case, we have some other techniques of using - pooling the urine, and using some chemicals that would get most of the urine analysis. You are correct that we would lose some of the hormone balance.

SPEAKER That's if we can't freeze it. At the present temperature we're stabilized. It appears, you know, we could freeze the urine. We may not keep the food if we get up - -

SPEAKER There would be some degradation in the blood and urine analyses, that is true.

SPEAKER You might be able to still freeze, even with a - say a degraded system.

PAO Yeah. We'll take one final question, (garble).

QUERY Just for the record. There's nothing at this point that precludes your planning for two full 56-day missions?

SPEAKER No there is nothing.

PAO Okay. Thank you ladies and gentlemen. Our operational people will be here momentarily.

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SKYLAB NEWS CENTER
Houston, Texas

Skylab Program Post Mission Press Conference
Johnson Space Center
June 22, 1973
11:10 a.m. CDT

Participants:

Mr. William Schneider, Skylab Program Director
Mr. Kenneth Kleinknecht, Skylab Program Manager, JSC
Mr. Leland Belew, Skylab Program Manager, MSFC
Dr. W. Royce Hawkins, Deputy Director for Medical Operations, JSC
Major General Kenneth R. Chapman, DOD Mgr for MSFC Support Operations
Mr. Donald K. Slayton, Director of Flight Crew Operations, JSC
Flight Director Phil Shaffer
Dr. Robert Parker, Astronaut and Skylab Program Scientist, JSC
Jack King, PAO, JSC

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PAO Okay. I guess we're ready to procede with our second news briefing this morning. This is with the Skylab Program press conference. Like to introduce the principals to you. From your left, Mr. Bill Schneider, who's the Skylab Program Director; Mr. Ken Kleinknecht, who's the Skylab Program Manager, from here at the Johnson Space Center; Mr. Leland Belew, the Skylab Program Manager, from the Marshall Space Flight Center. Major General Kenneth R. Chapman, who's Department of Defense Manager for Manned Space Flight Operations. Next we have Mr. Donald K. Slayton, who is Director of Flight Crew Operations, here at the Johnson Space Center; Dr. Larry Dietlein who is Deputy Director of Life Sciences, at the Johnson Space Center; Dr. Robert Parker, who is Scientist Astronaut, and also the Skylab Program Scientist; and Mr. Phil Shaffer, Flight Director, and Phil is also representing the Flight Director Team. Mr. Schneider.

SCHNEIDER Good morning. Well, today, we ended the first operational phase of the first manned Skylab Mission. But, at the same time we began two new phases. First, of course, the unmanned phase of the second mission and more importantly, we have begun the data analysis phase on the Skylab-II. And, of course, as we've been saying, it's in that data analysis, the results of those experiments that the real worth of Skylab will be found. Now much has been said in the past few days about the usefulness of man and all, that man has been able to do for Skylab. That of course is no real surprise to us. That's the way we have felt. And, indeed, although we've used man in the way that he may not have been preplanned, we had planned Skylab to have man as an integral part of the system. However, from an operational standpoint, just to quote statistics, we did get a great number of our experiments, despite the fact that we had two unscheduled EVA's and of course had the major problem with the power-down phase earlier in the mission. We got over 80 percent of our ATM objectives achieved. We looked at the Sun 80 percent of the time, when we had planned on. And got over 30 thousand pictures of the Sun. But, more importantly, we saw a flare up there. And, I understand, from the solar scientisst, it was a very important scientific achievement. We also saw some loop prominences on the LM, and the scientists have already seen some things that were never suspected beforeon the Sun. Many of you have heard that we did have within Skylab a rocket shot, namely the Cal-rock rocket, where we did get instruments up, very much like Skylab instruments, and they have just wetted the PI's appetite. And they can just barely wait to get the ATM film back. But in addition to

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that, we had two other rocket flights ... the office of space science, and we had a world-wid work of solar scientists looking at the Sun. In the ..., why we got 80 percent of the passes. Although, in ... early phase some of the passes were rather limited because of the power. We were able to look at 31 states and 9 countries, and looked at 182 sites. Also, we were even able to look at Hurricane Alva, which was a joint NOA-DOD-NASA exercise. We've had a very major exercise and we were able to look at one of our sites almost simultaneously from the EREP - Skylab EREP. Also, with our unmanned ERTS satellite, with high-altitude aircraft, low-altitude aircraft, and also with scientists on the ground. We should get great deal of data about Earth Resources and what we can do from those exercises. In the medical world, we got apparently over 90 percent of most of the ex - -

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SCHNEIDER - - about Earth resources and what we can do from those exercises. In the medical world we got apparently over 90 percent of most of the experiments, some of the experiments we got well over 100 percent of what we had planned. Of course you saw the crew get out on the deck and the 28 days in zero g obviously was one of our big objectives, and it remains to be seen just what does happen. I think the indicators are very favorable for a 56 day mission. In the corillary area we had a great deal of trouble getting all of the experiments in the scientific airlock since we lost one of them. But we managed to get 84 percent of those experiments in. But of the other corilary experiments we were able to get 157 percent, so we did rather well there. Eight of those corollary experiments we got well over 100 percent of all the objectives. The student experiments we actually conducted 5. Four of them we got 100 percent of the objectives, one of them we only got about 30 percent. Two of the student experiments, because of the change in lift-off and the fact that nature didn't cooperate with us we didn't, we weren't able to do. Namely we didn't have any volcanos and we didn't look at Mercury because it was in the wrong conjunction. And we got 8 hours of TV. Now right now I guess we'd have to say that we are getting ready for Skylab III. As was stated earlier our launch date is officially the first M equal 5 rendezvous day after July 27, July 27 orthere after. We won't know for a week whether that's the 27 or the 28. Today it looks like the 28, and we ought to be able to know that around the first of the year. Everything is good. You heard about our refrigeration loop problem and I won't say any more about that. I would like to say express right now my very great appreciation for all the operational troops who did a fantastic job both here and at Huntsville. And I would be very much remiss if I didn't mention those beautiful recovery troops out on the Ticonderoga. I have a soft spot in my heart for the Ticonderoga, I was part of the commissioning crew. But they did as well without me there as they used to do with me there. But all went well and we were on time. Now there has been a lot of discussion about what went wrong with Skylab, and obviously we did have some things that did go wrong. Most of which are directly attributable, not all of which but most of which are directly attributable - to one problem, namely the lift-off problem that we had. I'd like to draw your attention to the literally tens of thousands of things that didn't go wrong. And you haven't heard much about that, but literally that equipment is working like a jewel up there and I'm quite proud of it. Looking at our official objectives, they were to establish the workshop in orbit, obtain the

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medical data, and to perform experiments. We did all three of those obviously, and I believe we did them well. I think we kind of proved something which may or may not have been an objective, but at least as far as I'm concerned the obvious visual proof of what we've been saying that man is a useful thing to have along was proven. So at least for my own personal satisfaction I think we did 133-1/3 percent of our objectives.

PAO Thank you Bill. We're now ready for questions please.

QUERY In a briefing with Dr. Hawkins yesterday, there was quite a bit of emphasis placed on the fact that there was going to be a 10-minute medical conference before anything happened. Before the crew even made a move outside the hatch or apparently even got up and really moved around inside the module. And yet as soon as that hatch opened, Pete come bouncing out of there like a rubber ball. Any comments on that?

SPEAKER I wasn't under the impression that there would be a formal conference actually. What was happening during that time was that the science pilot was checking the pulse and blood pressure of the other twocrew members and vice versa.

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SPEAKER - - was happening during that time was that the science pilot was checking the pulse and blood pressure of the other two crew members and vice-a-versa prior to opening the hatch. But I - this was scheduled and it was part of the medical examination.

PAO Nick.

QUERY Did Dr. Kerwin talk to Dr. Ross?

SPEAKER I'm sure he did. I don't - I can't answer that specifically. We were in communication with the recovery ship and got a quick medical look at 10:04 this morning. And we talked to Dr. Ross and he had been , of course, in communication with the crew.

QUERY (garble). Can you say, either from your own observation on the television or through talking perhaps with Dr. Ross, whether or not the pressure devices were used by the crewmen at all, or whether they just got up and left?

SPEAKER Yes. We know from the medical report that the pressure - You're speaking of the leg garment, the countermeasure garment? Yes, it was used on one of the crew members. And this was used 25 minutes after splashdown because of - there was some light headedness and the blood pressure in one of the crew members was a little on the low side so it was elected to inflate the suit. This was in the science pilot.

PAO Go ahead, Mary.

QUERY The other crewmen didn't use the pressure garment at all?

SPEAKER They had it on, it was donned but it was - -

QUERY Yeah, I know.

SPEAKER - - not inflated.

QUERY Do you have any figures on what the pulse rate and the blood pressure and the degree of dizziness was?

SPEAKER Yes, there was some dizziness. It was described like coming in at 2-3 and some light headedness. There was - this was (garble) by head movements while they were on the water, and this was noted in both the science pilot and pilot. However, the checks on the blood pressures and the pulses, both by Dr. Kerwin and then by Dr. Ross, indicated that only one crewman really needed the garment inflated.

QUERY Conrad show any signs of this or do you know what his blood pressure and pulse was? Do you have (garble)?

SPEAKER Yes, I do. His blood pressure was approximately 110/80 standing in the command module. His pulse rate at that time was 110, and he had no subjective effects. The scienct pilot had pressure about 95/75 uninflated,

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and after inflation it went up to 130/80.

PAO Okay, down here. You have a question?

QUERY Mr. Schneider you said that the - -

PAO Keep going.

QUERY You said that the indications are that they're in very good health. Is there something else that you have to add that - that hasn't come out during the mission, during the crew, or is that what you're referring to?

SPEAKER No, I was just paraphrasing what Dr. Detline had told me before. And the indications are that everything is well. You saw them come out of the ship; they certainly look good to me. From what I heard from the initial report, why everything looks good.

PAO Right back here.

QUERY Is there any more information from down range in advance of the formal 5-6 hour medical exam on subjective reactions on return. Were they dizzy? Did they - are there any adjectives you can give us to describe how they felt?

SPEAKER As I said, on the water in the spacecraft, there was some lightheadedness or dizziness on the part of the Pilot and Science Pilot, and this was (garble) by head movements so they stayed quiet. Of course, there were some swells and this is not unexpected. The spacecraft is not the most stable boat in the world as you know. No symptons were reported from the Commander. Then the - in the case of the Science Pilot, the blood pressure was noted to be low and the lightheadedness continued for approximately 25 minutes after splashdown, at which time it was elected to inflate the suit.

PAO Wait, John. I'm sorry, go ahead.

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SPEAKER - - like to inflate the suit.

QUERY Of the three crewmen, Kerwin seemed to walk in the most pronounced unusual way, sort of crouched down a little bit. Was it as if his legs were asleep a little bit?

SPEAKER Well, I think, if you notice carefully most of the crews, when they exit from the spacecraft, do have a wide-based gait. And I think this was apparent on all of them. Kerwin, perhaps was caught and was more pronounced, because you could see him more clearly. He wasn't masked by people in front of him, at least the pictures I saw.

SPEAKER Well to try to walk with an inflated G-suit, you've got a little inhibition there, to say the least, also.

QUERY Dr., could you give us the pulse rate on Kerwin? And also, the blood pressure and pulse rate on Weitz?

HAWKINS Well, at 7:42, the commander's blood pressure, as I said, was 110 over 80, and in the standing position, his pulse is 110. The science pilot, at that time, had a blood pressure of 105 over 65, with a pulse of 84. This was in the sitting position. And the pilot had a blood pressure of 95 over 65, with a pulse of 75, in the sitting position. The blood pressures were taken periodically from splash down on and there are many values reported. These will come up in the official report. Suffice it to say that the only really significant, or progressive, change, if you will, was on the science pilot. And I read you that blood pressure bottomed at 95 over 75. Because of the light headedness that progressed and continued, it was elected to inflate the suit. That's why we have the suits there, actually. This is not unexpected because, we did see some deconditioning in the LBNP tests in flight, as you know.

QUERY And the science pilot's pulse rate was what?

HAWKINS It was 84 in the sitting position. That was the first one that was reported to us. That was at 7:42.

QUERY A couple of questions. One, did Kerwin, when he was walking out of the hat - out of the spacecraft, have the pressure garment inflated at that time, all the way into the SML?

HAWKINS Yes. It was inflatad some 25 minutes after splashdown.

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QUERY And - Okay. And secondly, Aside from the medical examination onboard, have the astronauts had any other activities? Did they make phone calls to their wives or anything like that?

HAWKINS Not that I know of. I can't answer that. We waited for quite some time to get in touch with the Surgeon. And whether they were in touch with other people before that, I can't say. We first made contact with them at 10:04.

QUERY Have you any theories as to why Conrad didn't show any of this, compared to his two crewmates? And, also, do you have any other medical reports from Dr. Ross, perhaps on their general condition?

HAWKINS In their general condition, aside from this vestibular phenomenon, noted in the spacecraft and exacerbated by head movements, and apart from the blood pressure, we have no other reasons to suspect that their health is impaired in any way. In fact, they looked quite good. Far better, than I, personally, had expected. Was there another part of the question, I'm sorry.

QUERY Do you have any theories as to why Conrad has maintained this quite calm level throughout?

HAWKINS Well, he was in excellent physical condition, as you know. But we see this often, you know if there's a lot of individual variation, one will just be nominal and others will show other changes. In Al Shepard's Apollo Flight, the other two crewmen lost weight, for instance. He didn't lose any weight. And things of that sort. You always find this individual variation. And I think if you had a large enough (garble), you'd find, probably, a bell-shaped curve with people at both ends and a lot in the middle.

QUERY Dr., do you have any idea of what would have happened to Kerwin, if he'd stayed up 2 or 3 more weeks or - -

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QUERY Do you have any ideas of what would have happened to Kerwin if he had stayed up 2 or 3 more weeks? Is there any - that he could have not made a 56 day mission?

SCHNEIDER No. This deconditioning phenomenon, if you will has been observed, as you know, following practically all of the flights. And I can only speculate I don't think that it would have impaired his performance in the 56-day flight. What we believe from analog studies from bed rest studies, weightlessness analog studies, is that they probably plateau at about 4 to 6 weeks in the cardiovascular sense and do not continue this deconditioning process. The body of the individual has adapted at that time to that specific environment, and remains stable. We expect to see this on the longer flights, the 56 day flights, a plateauing effect not a continuing decrement.

PAO Next question. All right go ahead, go ahead.

QUERY How long did Kerwin wear the pressure garment? And is he still wearing it?

SCHNEIDER They have begun the medical examinations which will take the greater part of the day, as you know and they are done sequencially on each crew member. He is wearing it now and will be tested, will do a stand up test with the garment and then without the garment, and then will go through the lower body negative pressure without the garment the same as the other crew members. So his test will take a little longer. It will not be required - he will not be required to wear the garment indefinitely, let me say.

QUERY Mr. Schneider, did I understand you to say a little while ago that - something to the effect that scientists have seen things never suspected before on the Sun, or they think they might have some indication of something there that they never suspected before? And what were they?

SCHNEIDER Let me turn that over to Bob Parker, who is our Skylab Scientist. He can answer much better than I.

PARKER On that one, I think to say that we've seen something that we've never seen before, is to extrapolate a bit beyond, you know, or in fact that we never ever expected before is to extrapolate quite a bit beyond what has actually happened so far, particularly since we've seen very little data. Most of the data comes back on film as you are well aware. I really don't - I think we've confirmed some things that we thought were there, which we have not seen as well before. And I think that is about as strong a statement as I would make at the present time on that. You know a lot of

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things that we suspected were there and had seen hints of before and theoretically believed were there, which we believe we're confirming. But until we get the film back and really look at it carefully, you really can't go any further than that. I know plain out and out know of no outstanding discovery that we just had totally no idea of before.

QUERY I think you went into this briefly the other day, but also, what sort of an idea, how long will it take maybe to begin to determine some of these things what is on that film and so forth.

PARKER The film won't be getting back here to Houston again until the end of the weekend, probably even Monday. And I would expect that the PIs would begin to get their hands on it maybe by the end of the week. I really don't know exactly what the schedule is. It doesn't look like anybody else does either.

SPEAKER I was asked that question eailier this week, in order to anticipate a question like that. In general the ATM PI is in need of about 4 weeks to have something of some substance. That's a general of all figures. That would be my classification - a kind of first look of some significance.

QUERY Two questions. Can you say Mr. Belew how long it will take before the EREP data becomes available in the same way?

BELEW I think you might want to turn that over to JSC in that that's a part of their responsibility. Bob, do you know.

PARKER We will start developing some of the EREP film Monday morning. And it will come out probably a couple of weeks thereafter.

QUERY I have a question for Bill Schneider. Would you assess what we have learned from the sun shield and the SAS wing problems and how we're going to put it into effect?

SCHNEIDER What we have learned from the sun shield and the SAS problems - -

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SCHNEIDER - - what we have learned from the sunshield and the SAS problems. Well, I guess the thing that we've confirmed for ourselves has been the Skylab mode of operation is pretty good, which is to plan conservatively and to execute boldly. That has been our mode of operation throughout the program and I hope we'll continue it. All of our ground plans we try to - to carefully plan things out which we did on those - both of those exercises and then we intend then to move out with them and do what has to be done forthwith.

PAO Okay, let's take a couple of more questions if we have them, and then I think we'll be ready to wrap it up. You have anymore questions?

KLEINKNECH I'd like to add something to what Bill said. I think we also demonstrated that man, whether he be on the ground or in the air, is the most flexible, adaptive, nonspecialized machine in existence today.

PAO Thank you, Kenney. With that we'll wrap up the conference. Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
HOUSTON, TEXAS

CHANGE OF SHIFT BRIEFING
JOHNSON SPACE CENTER
JUNE 22, 1973
5:28 AM CDT

PARTICIPANTS:

NEIL B. HUTCHINSON, FLIGHT DIRECTOR
DAVID GARRETT, PAO

SL-II PC-71A/1
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PAO Okay. We have Neil Hutchinson, Flight Director for the last shift who will give a briefing.

HUTCHINSON Okay, does somebody know how long we have until AOS here, at the States? I guess somebody will give us a signal.

PAO One minute and 30 seconds.

HUTCHINSON Okay. Well, we'll make this short - do you want us to just press on right through the stateside?

PAO Well, why don't you go - as much as you can say right now, and then we'll stop. Okay?

HUTCHINSON Okay. Well, I guess you'll have been listening to loops and you probably know that we had a little tough time there during the latter part of deactivation. And the basic problem that we have run into is that all of a sudden one of the few systems that appears not to be - at least that we thought was working very normally and has every since the very beginning of Skylab, has started acting up. And that's namely the refrigeration system, the thing that chills our urine and blood and keeps our food - frozen food, cold; and of course cools our water. The - we're a long ways from understanding what's wrong with it. We took some steps, some fairly drastic steps tonight before the crew left to try and see if we could cover the situation. It's hard to say yet whether we've been successful, but it doesn't look very good at the moment. The basic anomaly is not understood. For some reason neither the primary nor the secondary refrigeration systems seem to be able to cool the freezers. And that's about all I can say about it. We're doing an awful lot of data and also some scurrying around. As you know, we did a rather drastic maneuver to try and stick the radiator up in the Sun because one of the predominant theories, and still is a pretty good one, although it doesn't look as likely now as it did, was that we had indeed possibly frozen a portion of the radiator up and therefore couldn't get coolant flow through it, and therefore caused the loop to heat up. The reason we delayed the undocking a little bit was because in the process of doing the maneuver we had some more problems with the rate gyros are - we had our usual problems. A couple of them got kicked offline. We also had a situation where we were - we did the maneuver in a - we started out with a momentum situation that was not definitely not totally squared away, and of course, the maneuver didn't help it any, and so we had to get the momentum in the workshop all sorted out before we could get it in the right mode to let the crew undock in. And that's basically the reason we delayed undocking. And it was a matter of configuring the APCS to support the undocking.

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Deactivation other than the refrigeration system was completely normal. And we got a good closeout in the workshop, and everything else in the workshop looks great. That's quick and dirty.

PAO Okay, we decided that if we could just go in there for a few questions, and we'll tape this stateside pass and play it back. Any questions? Mary.

QUERY Okay. You say it doesn't look good at the moment - -

PAO You're not getting her on the mike.

PAO Mary, could you come up here and just sit up here if you have some questions? And - - What's the problem? Okay, all right, we'll have a mike here in a minute. You just wait just a second. In the meantime if you could come up here it'll be good. We could start the - -

QUERY Maybe you can repeat my question so I won't delay you. You say it doesn't look good at the moment. Do you mean - can you explaine further?

HUTCHENSON Well, I was referring specifically to the coolant loops and the - I mean the refrigeration loop and what we have done so far. It appears as though our thermal shock maneuver was unsuccessful. However, I think it's really too early to tell. I think we're going to have to look at it for a while. I'd like to reemphasize that the whole problem that we seem to be having is not well understood. However, we discussed in a great amount of detail whether or not there was anything that the crew could do first. And we were then, I'm still convinced now, and everyone else is convinced that there was nothing the crew could do for us. We did send them down there once to check some circuit breakers for us and they were in. Those loops are automatic. They have a completely automatic control system that controls one loop switching over to the other, and so on and so forth. They're also completely commandable from the ground, as far as turning pumps on and off, switching loops, etc. So we feel like we'll be able to do anything they could have done. And of course, they did check all the freezers and everything to make sure that they got the doors all shut after they were in them today. And that's not symptomatic of the thing we're seeing anyway, a freezer door open or something, because the entire loop is not performing properly.

PAO Next.

QUERY Well Neil, first of all, did you consider keeping the crew there to see if they could do anything? And then secondly, if this thing doesn't settle itself out, what happens? Do you - do the temperatures keep going on up in the freezer and you lose your food and ruin your chances for the next

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two missions, or what?

HUTCHINSON Well, first questions first. Yes, we did consider keeping the crew there. And I answered the question already, we discussed it thoroughly and are convinced, were convinced then and are convinced now, that the crew - there was nothing the crew could do for us.

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HUTCHINSON - - are convinced, were convinced then and are convinced now that the crew - there was nothing the crew could do for us. As far as the temperatures going up, it's not at all clear where they are going or whether they are going to go up any more because it is not at all clear exactly what the loop configuration is. The kind of thermal response we're seeing it would appear that we have a loop temperature situation that ought to be demanding 100 percent flow through the radiators, and it looks like we're getting something on the order of 20 percent. That is the kind of thing that the loop temperatures say now. It's not clear that we understand exactly what the loop temperatures are saying. Thermal problems are very hard to analyze in a quick fashion. In fact, I'm sure it will be days before we figure out exactly what is going on. I am not sure, I don't have any information as to where the loop will stabilize if indeed the radiators - we've got a blockage in the radiators. We can't - we're going to be completely bypassed or some other anomaly. It's not clear where they are going to stabilize. Right now the freezers are somewhere in the order of 10 to 12 degrees Fahrenheit, where they are normally down below 0. Of course the food that is in there is no where near our total Skylab food supply. In fact I don't hardly - well, I consider it a problem, but the food situation - we probably have about - about 15 percent of our total food supply is in the freezers. The rest of it is the food we call ambient food. Obviously that food - if they warm up enough to ruin that food, we've got some kind of a food resupply situation, certainly not an insurmountable one. The one thing that does come to mind that I'm not sure how we would handle is the urine and blood and microbiology work on Skylab III and IV, because that facility is also required for that storage of that stuff. And you know, it is too early to say where the loop is going to stabilize. And until we understand that, there is no way to really say what it is going to do to the food. Obviously it is in a posture right now - I mean if it stabilized right where it was it's certainly not good. I don't have any numbers on what 30 days at 10 degrees Fahrenheit would do to the food, but it is bound to degrade it some. Now there is of course obviously some point where it makes it totally unusable. But I don't think the food is the primary concern here. I think the concern is really - it's certainly a concern, but it would be more of a concern to me anyway as to how we would handle the urine and blood on Skylab III and IV.

QUERY Could you take some sort of back up system for the urine and blood?

HUTCHINSON It's certainly possible. As a matter of

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fact, I've already heard one person suggest we ought to take a refrigerator up that plugs in. But yes, that's certainly possible.

QUERY This is kind of a more general version of that question. Is there anything that the next crew could do, as far as repairing the present system or taking something along?

HUTCHINSON Well, obviously - I really don't think at this point that there is anything that they can do to troubleshoot the system that we've got. I think anything that is going to be done can be done from the ground. And we are - it is either going to recover itself or we're going to piece together what happened to it and figure out that it's broken or it will stay like it is and we'll never figure it out. As far as them bringing something else up there, that's always a possibility. I really wouldn't want to comment on that. I really - you know, I mean it is certainly within the realm of possibility.

QUERY Do I understand you correctly, you think that even if this thing goes to hell and you can't use it at all, that you still would conduct your other 2 missions and the main thing that would be jeopardized would be your biological things, you know urine and blood and what have you?

HUTCHINSON I think that is a reasonable statement. There is going to be - certainly going to have to be some assessment of several things. For example, if the - if indeed it spoils the food, the food program that we currently had envisioned is going to have to be revised because we're going to have to supplement for those foods that we lost. And that's going to - I really don't know what that is going to do to that. We probably would be wanting to figure out some way to be able to continue to do the blood and urine programs under some other circumstances, which would probably mean we'd try and figure out something to take up there with us. I'm not sure. I really don't know. I would think it's fair to say that it isn't going to jeopardize anything on Skylab III and IV, as far as the overall missions go.

QUERY Could it delay it? You know like - -

SPEAKER I don't know. I think that would depend on if they decided to try and fly some fix up or whatever. I really doubt it, frankly, very seriously.

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HUTCHINSON I really doubt it, frankly, very seriously.

QUERY You doubt the fix up, you mean.

HUTCHINSON No. I doubt that it would delay it.

QUERY Oh, I see. In the mean time, what are your hopes at the moment of fixing this thing?

HUTCHINSON I really don't know, Mary. It's still too soon to - I mean, it only happened a few hours ago and we're still trying to understand what happened the first time, let alone to fix it. We have basically done everything we know, to fix it, at the moment. We have switched loops, we've switched pumps. We've had the crew check all the circuit breakers. And we have done the thermal shock thing, which we thought, where if we had - if we had a freeze up down there. So, we've basically done all the troubleshooting that we know how do to. However, things like that have a tendency to, after you've had a little time to think about them, you think about some little clever trick that you might be able to do, like turning one loop off and immediately turning the other one on, or turning one off and letting it sit for 3 hours and turning it on, so on and so forth, that might prove to be successful. I don't think we're abso - In fact, I would say, we're not absolutely certain that we haven't already been successful. It doesn't appear as though the thing is responding the way it ought to. However, the thermal world has fooled us before. And this obviously is a thermal situation.

PAO Okay. Are there any more questions? All right. Thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Commercial Benefits from Skylab Electronics Technology
Johnson Space Center
June 21, 1973
3:02 p.m. CDT

Participants:

Max Engert, NASA/JSC
R. H. Webster, Ampex Corporation
Roy G. Gage, SCI Systems Inc.
Thomas H. Kenton, Westinghouse Electric Corporation

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PAO Good afternoon. I'd like to welcome you to the AIAA Briefing, this afternoon. We'll make this as informal as possible. And we do have some handouts that will be available after the briefing. And the briefing is being taped and will be transcribed by NASA. And these transcriptions should be out within a day or so. I'd like to turn this meeting over to Mr. Max Engert of NASA.

ENGERT Thank you. Of course, I guess you've seen the title of our presentation. It has to do with the applications and commercial area of Skylab Electronics. Before we get to our main speaker, here, of which there will be three I hope. (We're missing one man.) I'd like to point out just a few of the general aspects of the NASA type technology transfer. Most of the transfer does not occur on a one to one basis. We find that the NASA equipment does not transfer in its entirity without some modification. But there are some important exceptions to this. Mainly, the data relay and the sensing satellites, where we find our electronic systems are transfered more or less intact to the commercial communications satellites, weather satellites, and in the future we'll have navigation satellites, and Earth resources satellites. It'll be commercially active. Generally we find, though, that the transfer is in the areas of components, or design techniques, manufacturing processes, - piece parts, if you will. These have come about because NASA's developed or improved these area, primarily because of our requirements for high reliability in the environments that we face. And because we have concern for crew safety, we want reliable components systems. And we're also forced to do a fair amount of R&D, because of our push to get our size, weight, and power down within our spacecraft limitations. This kind of development, though, has lead to a number of commercial benefits, which we might classify, generally, such things as electronic circuits, - we have a number of coding techniques for TV and voice and data, which overcome the limitations of noisy communication link. A number of signal design approach for data systems, redundancy techniques that we've developed to improve reliability, test procedures. These are the kind of mundane things, but they all add up when you think on an overall basis. These improve quality control. There are a number of materials that have gone into electronic devices, such as ceramics. There's the area of computerated design, where we've found the programs that we've developed have helped transistor manufacturers reduce their costs. Then certain industries have picked up NASA standards and specifications and put them in their manufacturing line. And this has helped them to improve quality and reduce their cost, as well. And then we have a number of electronic

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components and component packaging techniques that have derived from NASA techniques. What we have today is our three systems from the Skylab Program, that fall in these general categories. They're specific examples that make you realize how we get into it. The Skylab Data Acquisition System has provided the basis for pipeline control systems. The Skylab EREP tape recorder has contributed to the commerical line of recorders. And the Skylab TV camera image tube is now finding use in commercial TV cameras. So, we'll get into our speakers. Our first speaker is Mr. Bob Webster, here on my right, who's with Ampex Corporation, California. And he's going to talk about the Skylab EREP tape recorder. He's the Program Manager of that program. Bob.

WEBSTER Thanks, Max. That introduction certainly fits our application. In spite of what you may have read, over the last year or so about the adverse conditions of Ampex, we're still proud of our heritage, going clear back to - -

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WEBSTER In spite of what you may have read in the last year or so about the adverse condition of Ampex, we're still proud of our heritage going clear back to pre-recording of old Bing Crosby radio programs right up through the developement of video tape and the instant replay, which you're certainly familiar with. The Ampex Corporation has 7 divisions, just describing them briefly to show you how we fit into the overall scheme. The Audio Video Systems, products for radio and television broadcasting, teleproduction, education, and recording studios, all the way from single channel professional audio recorders to the color television recorders cameras, switches and duplicators. The Computer Products Division, peripheral devices including tape drives and electronics disk core memories and such. Magnetic Tape Division where we are one of the largest producers in the country of magnetic tapes, ranging from high-density instrumentation tapes, computer tapes, video and wide-band tapes, and the consumer home tapes. We also have the music division, which markets the reel and casette tapes, both blank and prerecorded and home recording devices. We have an international division which has wide distribution of all of our tape departments. Then of course Advance Technology Division to keep us ahead of the state of the art. And seventh, the Instrumentation Division, which I represent, which did develop the EREP tape recorder used on Skylab. We manufacture, develop and manufacture precision transports and electronics for all analog and digital recording, and reproduction in laboratory and portable airborne and spaceborne configurations. Specifically the EREP tape recorder, we didn't know it at the time, but I guess it started back in the mid 60s when we developed an AR600 was our model number for an airborne recorder, followed in late 69 early 1970 we got off the drafting board with our AR700. That AR700 which was airborne predominantly or mobile advocation recorder is the one that came closest to filling the bill for the Skylab application. We started with that basic recorder to meet the EREP requirements. The, one of the most outstanding modifications that we developed from that, well the first thing we had to do was expand it. It was originally developed to have a 7-track or 14-track capability on either half-inch or 1-inch instrumentation tape. This recorder is of a coaxcial type meaning that the driving mechanism is from a single source. The 2 tapes are stacked one on top of the other, rather than side by side, as in many of the home recorders that you may have seen. In order to double the number of channels from 14, which is the maximum capability, we had to go to 28 tracks. Each track 7200 feet long. This nearly doubled the electronics

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it did not materially change the transport or the tape driving mechanism. But the electronics of course had to double, so that the power supplies to provide power to those electronics. When we designed the first 28-track commercial recorder in 1970, this machine required about 300 watts of primary power. NASA says too much, so back to the drawing board, and with considerable effort, but we felt very successfully were able to reduce that down to 200 watts. We cut a third of the power out of it by redesign, changing of circuitry as well as components. That power reduction of course is a direct advantage in our commercial products. Every aircraft - -

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WEBSTER That power reduction, of course, is a direct advantage in our commercial products. Every aircraft application, of course, has a simular type problem of wanting less power drain so that is one of the examples of a NASA development which will be directly applicable to our standard products. Another peculiar one to NASA was the reliability aspect. We completed design (garble) analyses, single point failure analyses, to try to upgrade the circuitry in the components that we use throughout our system. This resulted in replacement of some components, redesign of some circuitry, redundancy in some cases and in others just more testing of the components that we were using to get through the infant mortality rate and to make sure that the components that we were selecting and were going to use were of the highest reliability available. Now that has mixed application to commercial use, of course, because it cost money to select components and to use the higher reliability components. The circuitry improvements wouldn't would or have been incorporated in our standard products, those are all advantageous. Depending on the application, some of the higher reliability components in the prescreening testing may be applicable. The (garble) disc assembly, the motor that actually moves the tape very accurately so that you can put precise data and know exactly where it is on tape, required some redesign for NASA's extreme environmental shock conditions, not during operation but during non operating periods. So we did do some redesign in the method of assembly of this motor. Again that has limited application. The assembly technique was more complicated, therefore more lengthy, more expensive that the commercial version, so would not be directly applicable unless the commercial application really needed it. And in some case aircraft or some mobil applications will need it, so there's another advantage that will have limited application. The real drive motors, the motor that drives these concentric reels themselves, had quite a little, probably as much as any other single assembly, as much evaluation and analysis and modification to meet the needs as any other assembly here. The brush hardness; the contamination from the brushes. We're inherently used to building recorders that we can periodically maintain. And periodic maintenance normally takes care of cleaniness problems for us. Cleaning heads and cleaning surfaces that might get brush dust or dust from tape. Every time you pull a piece of tape through a machine there are microscopic but very real contamination and dirt from that tape and from the brushes from these motors. So we had to add extra

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filtering in the motor assembly itself to retain - not to prevent the brush dust from accumulating it will always be there. But to retain it, to keep it off of the critical areas and away from the outside atmosphere that the astronauts will be breathing. The breaking system. Oh, I guess all I could say there is to modify it to make it more nearly perfect, so that each time that break had to be applied, that it operated perfectly and not randomly or with variations in its operation. Residual magnetism oddly enough worked in reverse. As we tried to become more proficient and use closer tolerances in the machining, the fabrication and the assembly of these motors we found that low and behold the operators could get surfaces too flat and too smooth. And we actually had some residuals magnetism where two flat plates would literally ring together. When you went to pull them apart with small solenoid force, you couldn't get enough force because of the residual magnetism. So we had to make design modifications in reverse there to prevent from getting too flat.

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WEBSTER - is in where two flat plates would literally ring together. And when you went to pull them apart with a small solenoid force, you couldn't get enough force because of residual magnetism. So we had to make design modifications in reverse to prevent from getting too flat. And disassembly and assembly - reassembly techniques were improved, so that we didn't demagnetize these motors during the operation. Something called a pinchroller actuator - this is a device that actually signals mechanisms to come in and grab hold of the tape and pull it. We had to increase both the pulse amplitude and pulse duration of this circuitry to assure positive energizing of that actuator when demand was called for. Again, we found that maybe one out of a thousand times you push a start button and the recorder didn't move yet. And we were accustomed to perhaps contributing that to operator error - maybe he didn't push the button hard enough, or something happened - rather inclined to ignore it. But we found we couldn't ignore it, it was real, and we did have to redesign this circuitry to make sure every time the demand was placed on the system that it worked flawlessly. That is another modification that - well, a version of which is incorporated in the standard product today. Environmental evaluations were extensive, as you can well imagine, on this NASA effort. Electromagnetic interference susceptibility was of prime concern. So we spent quite a little time evaluating the susceptibility of the recorder to outside radiation. As a result of that improved grounding, power and signal line filters were added. These again are not currently part of our standard product, but our technology that we may be called upon at any time to need, many aircraft applications, depending on some of the mobile applications they may also be in areas where they are susceptible to outside radiation. Other transmitters or other motors, or X-ray machines, similar device, so - that was valuable information for us to gain. Temperature effects obviously advantageous. We did find a limitation that was unknown to us due to some low-temperature testing that the NASA specifications required. Generally these standard products of ours, and this particular AR700 standard products, has a heater in it. So, at lower temperatures there is a heater primarily to heat up the tape and moving parts to get better operation. For this application we could not use the heater, so we at least gained further engineering knowledge in just how far we can go without a heater, and what the limitations are, and some of those limitations have since been removed. High temperature effect, as far as the recorders are concerned, is primarily one of a complete mapping of the wattage and temperatures within the recorder. We now know not only where

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the power is being dissipated in great detail throughout the machine, but what the individual temperatures are throughout the machine. And as we expected, our biggest problem is not getting transistors, diodes, and electronic components to operate within the temperature range expected for the entire recorder, but to get tape to operate within the range. Tape is very critical of temperature. Long before you get up to the temperature where you might burn your finger if you touched something, why the tape becomes - it doesn't like to operate in those higher temperature ranges, so most recorders are designed to keep the heat away from the tapes. So the electronics is all on one side of a large casting, the tape and transport moving assemblies on the other side of the casting. So this temperature study and evaluation and minimizing of the extremes that the tape transport side, which were obvious advantages to our entire product line. Atmospheric content - -

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WEBSTER - - advantages to our entire product line. Atmospheric content wasn't planned on in the original contracts, but when Skylab got up there, the first question we were asked, I think, was, "What is the effect of the recorder on a hard vacuum? As most of you have heard, there was temporary problem where they had to do some outgassing, and in order to do that, they wanted to know what the effect might be on the recorder to go down to a pure vacuum. And we're very happy to report that - won'd admit to it being accidental, but at least we were fortunate in that our design did allow us to go clear to a hard vacuum and not damage any of the components. It would not operate in that environment - shouldn't say that - don't know that it will operate - how it will operate in that kind of environment, but we know that having been subjected to that and then coming back to a more normal environment, the machine does operate satisfactorily. That has now been proven. Lubrication - we changed a large number of the lubricants. The majority of lubricants that we use in commercial products began with the idea that we could provide maintenance and relubricate. We did have to change the lubricants to NASA approved lubricants throughout the machine, primarily for retentivity, to make sure they didn't evaporate, didn't disseminate during long periods of storage and use. Outgaassing of materials and components was related to the high reliability study I gave you. Our standard products, designed normally for economy in mind, use the more inexpensive components. But in many cases, those which are subject to outgasing over long periods of time giving out toxic fumes, which might be contaminating the air or toxic to the astronauts themselves. So many of the wire insulation, for example, and components and boards, PC boards, and components of that type that are prone to outgas were replaced with more suitable NASA approved material. Again, the flammability of these materials was also a consideration. Not only the outgasing but also the nonflammable materials were selected. We've gained a great deal of experience in encapsulating techniques and materials. We at AMPEX have used a number of conformal coating materials for coating our PC boards, printed wiring assemblies with the components on them. We had never specifically used the one that NASA wished us to use and that was an approved material; turned out to be a very difficult material to handle and to get used to using. We managed to achieve that and are able to remove it, rework boards, replace components and do rework on the boards, put it back together good as new. So that's been a tremendous advantage to us to be able to use their fine encapsulating materials. The high density and low bit error rate requirements of this recorder were rather

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extreme. On the 28 tracks, 7200 feet long, we had a requirement to be able to record and reproduce on a different machine, which complicates the problem. Now we have machines where you can record and reproduce on the same machine. Much more difficult in the industry to record on one machine, remove the tape from that machine, put it on another machine and play it back, and still not lose more than one error in every million bits of information that you put on that tape. Now 1 in ten to the 6th or 1 in 1 million bits is a very small, very low error rate for digital data in recording techniques. We've been able to accomplish that quite regularly. We have some machines now that we have been successful - -

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WEBSTER We have been able to accomplish that quite regularly. We have some machines now that we have been successful in recording and playing back one in ten million bits even. The twenty million bits per inch, the packing density of this recorder is exceptionally high for the state of the art in addition to the low bit error rate. The Miller code format that we selected, that we use in our recording systems is what has helped us to be able to record and reproduce these high density signals with low bid error rates. The head to tape interface becomes a very significant part of this problem. Not only is it difficult to do it electronically, but with new transistors, new components, on the market, we can do it electronically now. It has been difficult to do it magnetically so that you can reproduce those bits from a magnetic head to the tape, and then back from the tape back on the head again. We had produced some 28 track, and that's 28 tracks in 1 inch wide track, or 1 inch tape. We had produced those heads for ground instrumentation recorders previously. As a matter of fact, the ERTS program uses one of our recorders with 28 track 1 inch wide tape cassettes. That same general type of head is used for the reproduction of the Skylab data. A similar head had to be designed and developed for the airborne recorder, this AR700 that had to be expanded to 28 channels. So we now have a 28 track in 1 inch width for both the airborne and the ground recorders. We have had to devise head configurations for the intricate tape interface that is required at the speeds. The speed of this machine by the way is either 7-1/2 inches per second or 60 inches per second. It can be selected and changed in flight. So the system compatability of the recording in the air from the recorder to the tape and then hand carrying the tape back to Earth in a reproducing on the ground machine was something that we had very limited experience in prior to this time. So that's been very advantageous to us in studying the effects of head to tape interface, and improving the head designs themselves on both airborne and ground recorders. Tape threading and guiding was an interesting problem. I've recently seen some movies and I saw one some months back of an astronaut trying to thread tape. We take this rather routinely in Ampex, because our technicians thread thousands of tapes in the course of a year. But there aren't any of them can brag about having done it in wrightlessness. And it is a little different effect to try to put a piece of tape through a recorder when that tape just hangs wherever you put it. It's an entirly different effect. The problem of getting off of one reel around a number of idlers and compliance arms and between pinch rollers and through head paths

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You see there are 4 head stacks involved in one of these machines, not just one head but four head stacks. Around turnaround idlers, back past the other two and returning it back onto another reel is a rather complicated mechanical procedure. And we did make some improvements, they have not yet incorporated them in our standard products but will ultimately get them incorporated there, having to do with again the reliability of these mechanical components. Our products have primarily designed as I say again for field maintenance. If a screw comes loose the man goes and repairs it. If it is on the wrong angle he can replace it, he can move it, he can adjust it. Here again it had to be set up perfectly, and for all practical purposes stay there, no matter what happened. So we did incorporate some redesigns and some comliance arms, and some of the tape guiding paths were redesigned.

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WEBSTER - what happened, so we did incorporate some redesigns and some compliance arms - some of the tape guiding paths were redesigned. Cleaning and degaussing, of course, is something again we do quite regularly, and even the astronauts were able to get in and clean the heads frequently. As I mentioned earlier, there is residual no matter how infinitesimal it may appear, from every reel of tape. If you run that tape across the head, why it does shed an oxide which won't necessarily affect the recorder, but might affect the breathing capability of the astronauts. So, we clean those heads and moving parts quite regularly. Degaussing of heads - the machine was designed and assembled and tested in such a manner that the heads did not become gaussed, which is something common to recording, primarily because of the proximity of other electronic devices again. But was not necessary in this case due to the design and test procedures that were used. Well, all of these modifications that - and all I have listed here or mentioned, by the way, are the modifications which, either have been incorporated or very soon will be incorporated in our standard products at the instrumentation division. I did not touch at all or mention any of the numerous modifications, improvements and requirements that went into converting this AR-700 to the AR-728, known as the EREP tape recorder. But much of the subtle design experience that we gained in the development of this product will be used throughout the many divisions, including a tape division, where they are - just recently have come out with a new product, improved as a result of things that we've learned in this high-density, low-bit error-rate testing that we've been doing for the last 2 or 3 years. And obviously, from problems that we've had with tape and tape storage and other knowledge that we've gained over the last few months - highly conceivable that new versions of tape coming out in the not-too-distant future will certainly be trying to improve bonding and manufacturing techniques in tape, gained from the experiences on this program. Within the instrumentation division itself, the AR-700 and its product lines - I've mentioned the improvements there, the heads which we use fairly commonly throughout all of our devices, and the ground recorders, our FR1900, FR2000, which have been used for this kind of bit error rate and high density on both the ERTS and now the Skylab Program. Typical commercial consumers, by the way - you might be wondering who other than Skylab might use a product like the AR700. Since it is designed for airborne and mobile use, it's not a household item, but auto and truck manufacturers, for example, use them. Many commercial and government testing laboratories, some of which are associated with automobile testing, both

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US automobile companies and foreign companies, by the way, too, many vibration tests, many of the modern ecology shock tests and things that are instrumented with this type of recorder because of its portability and its environmental strength over and above standard commercial recorders. Farm and heavy equipment manufacturers for the same reason are using them. Heavy road building equipment, as well as heavy farm equipment, use these recorders, for example, due to their environmental rigidity. And commercial aircraft - there is a very large airliner these days, which does use a recorder of this type for recording much of the aircraft inflight conditions and health of the aircraft during flight. So those are the typical types of application of the 700 and how we hope to use the experience that we gained in modifying this standard product for NASA's use. Thank you, Max.

ENGERT Thank you, Bob. Would there be any questions at this time for Mr. Webster? If not, we'll go on the next speaker who is Mr. Roy Gage. I'm - -

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ENGBERT If not we'll call on the next speaker, who is Mr. Roy Gage. I believe Roy is going to tell us how his company is going to solve the energy crisis. Did you run out of gas on the way out here?

GAGE These gentlemen are from far off and I'm from a few hundred yards down the road, so guess who is late.

ENGBERT Let me tell you that Mr. Gage is with SCI Systems here in Houston. He is the President of the division, and he is going to speak to the flight planning control application.

GAGE Just a brief word about our company. I guess that during the Apollo program totally there were a number of companies that really were given birth to and (garble) with NASA and with the Apollo program and ours is one of them. We now are a little over 11 years old. Started in Huntsville, Alabama, strictly as an aerospace company. And our initial formation of the company was envisioned that we would build and design instrumentation for satellites and vehicles. So the name of the company that we started was Spacecraft Incorporated, a name which we are still explaining even though we changed it to SCI Systems. Up until about 6 years ago, our total company volume was at least 97 percent NASA. You could look at the various contracts and determine from that that we were contract or supplier to most of the major contractors in the program, most of the prime contractors. But if you looked at where their budgets came from, they all came from NASA. So we were in every sense of the word a NASA company. We had begun to adjust, we began to diversify about 6 years ago. And today we have about 5 percent of our total business with NASA. The rest of it is divided between industry and with the various other organizations within the government, including DOD, EPA, and a number of others. The greatest contribution I think our company made to the Skylab program was involved in the instrumentation of the vehicles themselves. We did have 4 experiments on the Skylab itself that were associated with medicine, and have been used quite successfully. Discussion today will relate to the instrumentation on the vehicles and how that led us into the diversification that I just mentioned. The acquisition of data for experimental vehicles of course is a prime importance. And we began to design equipment to acquire data and bring that data back in such a manner in real time or on tape that could be examined to evaluate a flight. And we progressed from that into complex systems that gather data from all over the vehicle or satellite and processed it back to a point where it could be telemetered back to Earth. The technology involved in that is an understanding of measurements, understanding of how measurements

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have to be made, and an understanding of how you process measurement and electronics in order to accurately obtain the data and record it. Those are the exact same technology that is required in a number of industries today. So our approach was to reduce to the fundamentals, those things that we had applied on vehicles and satellites and seek applications for those outside of NASA. And the industrial applications that we found for that were very much related to the things we had done there. An example of that is the pipeline industry. One of the prime parameters, a lot of which has been discussed already today was reliability of equipment, and the lengths that you go to in order to be sure your equipment isn't going to fail. In many commercial applications you don't need perhaps that much but there are many applications when it is almost that important. Another prime requirement of space oriented systems is weight. You need to have things as light as possible. Another is of course the power requirements, you need to minimize the amount of power required. Because if you don't, you are generally operating on solar cells and batteries. We found that in the applications industrially that required remote data acquisition, as opposed to data acquisition that you can all bring from a point processed locally, those same things are important as well as economy. So we attacked the - -

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GAGE - can all bring in from a point processed locally, and so on. These same things were important, as well as economy. So we attacked the pipeline and process control, and the petroleum industries as places where they might have the same requirements. And one of the first programs that we began to get involved with, once we had designed a product for remote data acquisition and control, was a requirement for obtaining data and controlling undersea oil production platforms. And one of the first of these was a program funded jointly by North American and by Mobile Oil. And the concept was - in their undersea platform - that you go down to the surface - to the subsurface by submarine and perform maintenance in an almost human environment where the production equipment is located. But you only go there for repair or maintenance under an - error condition. So if you're controlling the pump operation, the separation mechanisms, the measurement operations from the surface, it's extremely important you don't lose control, as you're, I'm sure, quite aware. It's also extremely important that your failures just be absolutely minimized, because of the expense of going out and maintaining the equipment. So the same things that had made our success in the instrumentation of vehicles was applicable here: reliability, light weight, power - minimum power, because there again was, for a large part, a battery backup system, and the way we package the equipment. It was small, it could put into a casting, could be sealed with an inert gas with water-proof connectors, and left. And during the entire time we've had to use it, it's never required, have fault in such that it was required actually to make a trip down below to service our equipment. We then began to back out of that - I think it was sort of natural to go to extreme requirements first with our background. We began to back then into the routine applications of data acquisition systems, into the surface applications of oil field control, oil and gas production field control, and to pipeline transmission and distribution systems for the same purpose. And again you have, typically for example, our first land system was one that is centered in Kentucky and covers five states and about 850 miles of pipeline. These are controlled through eight different telephone companies at a central station in Ashland, Kentucky, where an operator can get a total vision of everything that's happening on this pipeline - each substation, the pressures involved, the suctions involved, the temperatures, the vibration levels involved - have them displayed immediately on request, and have fault conditions alarm immediately when they occur. So that application, after five years, is still working fine; in addition to that, we now have similar type systems, that is, pipeline

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control systems - about 25 in the United States, plus systems in South America, in Libya, in Canada, and Australia. And we are currently negotiating for ones in Iran. The production fields, the oil and gas production fields, require the exact same hardware, and in addition, they require something that we didn't anticipate initially, and that was that in some of the sour gas fields that you find around, particularly in west Texas, you can a leave a penny out, and go back in about a month, and it's gone. The sulphur attack on copper is phenomenal. So you get into some of the subjects we've heard discussed before, the necessity for covering and sealing components, and preventing the environment from attacking them. And again, the exact same technology that we used in covering assemblies and coating them and testing them to that sort of environment was extremely valuable. It was quite easy, really, to make the change from the space application to that. Our variations on that have been quite a bit. We also have the same hardware now operating in process control plants throughout the United States and one or two foreign operations. I could go on quite a bit in the types of things that we've done relative to that. The product line now is based directly on experience we got in utilizing computers. And there's one other aspect I think that all three of us would probably agree to, that the NASA programs that have been useful in running large system programs industrially, and that is that you have a tight - -

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GAGE - - in running large system programs industrially. And that is that you have a tight schedule and a tight budget in NASA, and when you get into large systems where you're coordinating like we do, for example, through 8 or 10 telephone companies through remote stations that lie in five, six, seven different states and sometimes in foreign countries, where you have the problems - the logistics problems of support and the distribution problems or customs problems, the management problems interior to your plan. A lot of the management techniques that - that we learned in dealing with NASA in scheduling and meeting rigid schedules has been very valuable, and it's been a direct takeover. And if there's anything in our company that we can brag about for - in the management structure as far as program control is concerned, a lot of credit for that would be due to the influence of NASA on scheduling.

SPEAKER Will there be any questions for Mr. Gage at this point?

SPEAKER Okay, our last speaker is Mr. Tom Kenton, and he is with Westinghouse. He's vice-president of the southwest region, and he's going to speak to us about the TV camera applications.

KENTON Thank you, Max. As you can see, I brought my television coverage with me and, having kind of spent most of my life in marketing, I know the value of a demonstration over a rather dry speech. Westinghouse furnished two types of very sensitive low light level television tubes along with the television camera and other equipment to the Skylab project. One type of camera tube, called an SEC tube, is mounted on the Skylab's solar photographic cameras. And the SEC tubes act as sort of a super viewfinder for these cameras. The other camera tube helps to bring the activities of our astronauts to home television sets live. This other tube is called a EBS tube, and is a development and outgrowth of the SEC tube. Both television pickup or camera tubes were manufactured at our electronic tube division. This division's work is almost equally divided between commercial products, such as color television picture tubes for home TV sets and the more exotic high technology products such as radiation detectors, hollow cathode spectographic light sources, and SEC and EBS tubes. The monitor is turned on now, and you should be getting a clear if unexciting picture of me speaking. At any rate, naturally in a division whose business is divided commercially, militarily, and industrial our engineers and managers are always looking for overlaps and occasions when a highly technical

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product might also have excellent commercial possibilities. Such is the case with the SEC and the EBS tubes. And now to the demonstration. As I mentioned, the picture you're seeing is rather typical of images that conventional camera tubes can present. Now I'm going to ask that the room lights be turned down. There will be some momentary shifts in the picture while we adjust the amplification of the tube. But as you can see, as it gets progressively darker in the room we, still are able to present a picture that is bright and well-defined. The light is going for the point now I'm going to pass it to the control booth.

SPEAKER The picture you are seeing is being picked up by an EBS tube mounted in a closed circuit industrial camera designed for the tube. While not television broadcast quality, as you can see, the image is on a par with conventional closed-circuit systems, even at these low light levels. We could have just as easily used an SEC tube in the camera, even though it is about twenty times less sensitive than the tube that is being used. Both SEC and EBS tubes are able to function under this and even more extreme low light conditions because of the inherent ability of both tubes to greatly amplify electronic signals. Light rays entering the tube are turned into electrons. These electrons are propelled against either an SEC or EBS target. When an electron strikes the target, it can release as many as 2,000 new electrical charges. That is where the unique light-amplifying ability of the two tubes comes from. For comparison, typical television studio illumination is 500 foot-candles. This EBS camera will operate down to 10 to the minus 6 foot-candles. That is one with five zeros in front of it. Or five - -

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GAGE - illumination is 500 foot-candles. This is EBS camera will operate down to 10 to the minus 6 foot candles. That is 1 with 5 zeroes in front of it, or 500 million times less light than typical studio conditions. That means it will operate under light levels as low as those you have experienced on dark moonless nights. Yet, you noticed at the beginning of the demonstration that the tube works well at normal light levels. Actually, it is largely a matter of making some simple adjustments in the gain or amplifying ability of the tube. In fact, the tube works well through just about the whole range of lighting conditions from extreme darkness to high brightness. And now, back to Mr. Kenton.

KENTON Well, as I have said, it was natural for engineers with a high technology product like this to search for commercial applications. And in comparing these tubes to conventional TV camera tubes, I've hinted at some of the possibilities. We had designed the sophisticated cameras for Skylab, and even before that for NASA's Apollo program. One of the things Westinghouse engineers did next was design a series of standard cameras with solid state components like the NASA cameras, but for industrial and commercial uses. In addition, we began selling the tube to other camera manufacturers. Probably one of the first significant developments was the construction of a commercial television broadcast camera using an SEC tube. A West Coast firm has been marketing this camera for some three years now, and it is in daily use of many TV stations throughout the United States. In fact, NASA has one which you may see in the rear of the room. Their reports back to us indicate that the SEC cameras provide several advantages. In studio work, the SEC tube-equipped cameras mean that studios can operate at 10 to 100 times lower studio elimination levels. This is not only easier on the people who appear in front of those usually hot lights, but also means reduced power consumption of electricity, and lower operating costs. On location, the cameras require very few supplemental lights. And that's easier on the camera crew. But it is also an advantage when you are shooting live action such as night sporting events or news coverage. Another thing, SEC and EBS tubes are more sensitive to a broader range of spectral colors than conventional broadcast camera tubes. And this means that they provide inherently better color rendition under all lighting conditions. In addition to TV broadcast, these tubes have many other applications. Currently, Westinghouse low-light level tubes are helping to train commercial and military aircraft pilots in flight simulators. In the aircraft simulator,

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a pilot actually flies a minute probe over a minaturized landscape. The pilot looks through the cockpit window of the simulator, which is really a big television picture tube, and sees the landscape model as if it were real terrain. The model landscape view is picked up by a tiny wide-angle lens mounted on the nobe. The lens permits almost the same vision of the landscape model that a pilot would have looking out of his own cockpit. Because of its unique design and small size, however, the lens collects only a small amount of light, even though the miniature landscape is lighted with high intensity bulbs. So the Westinghouse low-level light tube picks up the light from the lens and greatly amplifies it for the pilot's TV monitor. Other aircraft application involved nondestructive testing. Instead of having to disassemble jet engines to look for material stresses or cracks, the tube has been mated to a long optical probe. The probe penetrates the dark interior of the aircraft engines, and the EBS tube picks up the image, amplifies it, and shows it on the conventional television monitor like the one that we have here. Maintenance engineers watch the monitor for dangerous flaws in the jet engines, and at the same time, a videotape record can be made from the monitor to record the inspection. One thing about the tubes that I have not mentioned, by changing their photo cathodes, that is, the light sensitive front end of the tube, you can alter the tubes to pick up radiation other than visible light, such as X-rays, infrared, and ultraviolet light. The amplifying ability of the tube is not changed. Several commercial - -

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SPEAKER Right. Such as X-rays, infrared, and ultraviolet light. The ampilfying ability of the tube is not changed. Several commercial application of the tube using this ability to detect unseen radiation. In one application, the tube is coupled to X-ray difractioning equipment. Defractioning equipment is used to study crystal structures and orientation both for scientific purposes, and is part of manufacturing of transistors, integrative circuits, and other solid state electronic products. An X-ray application under development right now uses an EBS tube to examine the structure of automobile tires on the assembly line. And this process, "soft" - that is low energy - X-rays are used to enhance the contrast of the different organic materials within the tires. Soft X-rays cannot be effectively picked up by flouroscope screens, while if the tire manufacturing used photographic film, as in conventional chest X-rays, his production line would have to be slowed down while the film is developed. Another advantage, of course, using the television system is the at the tire inspector can sit at the monitory and be shielded from the X-ray area. The third X-ray application is called auto radiography by television. This is a method for checking all types of turbine blades from aircraft turbines to power turbines for cracks that might occur through use. The turbine blade is treated with a radio-active material. And the radioactive particles collect in any cracks silhouetting them. The low light level tube with the radiation sensitive front end, views the turbine blades showing the crack silhouettes on a television monitor. Frequently SEC and EBS tubes are used to monitor industrial processes that cannot be viewed directly. For example; the camera we demonstrated here, has been used to guide the loading of light sensitive film. The darkened work area is illuminated by infrared light to protect the film from exposure. Consequently, the workers inside this area can see nothing. An EBS tube with a infrared sensitive front end, views the action and permits the worker at a TV monitor outside the darkroom, to guide the loading of the film cassettes. As you might expect, any camera tube with a low light level capacity, would eventually find its way into security and surveillance work. For example; we are looking into mounting a system aboard police helicopters. Mostly for traffic surveillance and spotting - especially at night - and during ground fog conditions. Seeing in the dark is not only a problem in police work, but also in another kind of detection. The detection of air pollution emanating from smoke stacks. We have experimented with EBS tube system, that will pierce darkness to do regular checks on the character and type of smoke coming from a factory. One of

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problems with viewing during haze conditions, is a situation called back scatter. Most of you have probably all experienced back scatter when driving in a heavy fog. You switch from low beam to high beam, but the extra light doesn't help. In fact, most of it is reflected right back at you. The same problem exists at certain depths under water. A scene too dark to be photographed by conventional equipment without extra light. But when lights are turned on, the sea water reflects much of the light back, blanking out the view entirely. To counter this, low-light level tubes have been mounted in under sea television camera systems. The tubes' low light level ability means that accessory lights are not needed and back scatter is essentially eliminated. While these systems are primarily for research work, they can also be used for underseas drilling and salvage. Underseas camera are all one example of more general use of these tubes and scientific research. Earlier I mentioned that the SEC tubes were being used as viewfinders aboard Skylab. On Earth, the tubes are a part of the viewfinder and guidance system of the mechanism for the 200-inch reflecting telescope at Mount Palomar Observatory, and 150-inch reflecting telescope at Kitt Peak. As you know, these are the largest, and second largest visible light telescopes in the worlds. The television viewfinder equipment enables these very expensive facilities to be used more efficiently. SEC tubes are also being used by astro - -

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KENTON - the facilities to be used more efficiently. SEC tubes are also being used by astronomers as replacements for photographic film in the basic data recording process. The equipment is capable of recording the precise quantitative measurements of stars a million times fainter than those that you can see with the naked eye. In addition these systems cut the required observation time from hours to minutes. In the laboratory EBS tubes are being mated to electron microscopes. Currently one microscope camera system is in use in the nuclear test facility of the Westinghouse Hanford Company. The electron microscope is being used to analyze the metal structure as part of the test facilities investigation of nuclear breeder reactors as an important source of future energy. At several medical research centers Westinghouse low level camera systems are being used on electron microscopes devoted to cancer research. These, then are some of the commercial applications of these tubes, and it's interesting to me to note that the Westinghouse tubes gave us live television coverage of the astronauts on the Moon and Skylab, are presently being used to televise night games of the Green Bay Packers and one day they may also bring us the Houston Astros. Thank you.

PAO Thank you. And if we have any questions now for any of these gentlemen.

QUERY For Westinghouse, Mr. Kenton, was the SEC tube, when it was originally being developed, developed for a space program application, or was it developed for one or more of the many general applications it seems to have?

KENTON I have a few experts here in the room with me. Don, would you care to make a statement about the early application of the tube?

SPEAKER A bit of the funding did come from NASA on the original part of the SEC development and also some of the EBS cameras that also were developed for them.

ENGERT Any other questions? Well if we have no more questions, that concludes the presentation. Thank you very much.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 21, 1973
1:29 p.m. CDT

Participants:

Neil Hutchinson, Flight Director
Milt Reim, PAO

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PAO - - here Neil Hutchinson, Flight Director. He's got a quick turn-around, he's got to come back in at 8 o'clock tonight, so we'll make this a very short briefing. Go ahead, Neil.

HUTCHINSON In reference to your comment, Pete, the unfortunate thing is that I can't sleep at my console like Mr. Conrad can. (laughter) Let's see - let me just give you a quick rundown on how the day's gone. Deactivation is - you've probably all been paying a little bit of attention to what's been going on today. The crew got up an hour early this morning. They are about an hour and a half ahead of schedule right now and I fully expect them to go to bed early. They'll probably get up about on time tomorrow morning. I didn't bring my checklist with me, which I might have known was a mistake, so I'm going to have to recall what the time line looks like tomorrow from memory. But basically when we get up in the morning the CDR is going to be going into the workshop - going into the CSM and start the CSM power up and he'll be up there the entire time. The only hatch that is closed in closeout is the MDA hatch, they're all left open. And the MDA hatch closure will be about 5 hours after - roughly - well about 4 hours after wakeup; 4-1/2 something like that; closer to 5. Make that 5 hours after wakeup. And the time line tomorrow is packed full. There is no room for anything in the retrofire day deactivation. They're - like I said the CDR gets up in the morning, goes up in the CSM and works in the CSM all morning bringing it up while the other two guys finish off the last final transfers and turn out the lights and the fans and so and so forth, and do the final circuit breaker closeout. And last man out is the PLT. And - let's see, as far as today's activities go I'm sure you all have heard by now that we had some problems with the trash airlock. In the process of deactivation the trash airlock gets a lot of heavy use. We have a lot of things we put down it. All kinds of stuff, both small packages and big packages. One of the things that we throw away is the thing called the charcoal canister, and it's part of the mol sieve, and it's a metal can. It's about this big around, it's about that long. It fits reasonably well in the trash airlock, which as you know, has a diameter about like that. It's a sylinder about that long. Due to some quirk in circumstance or the exact way that the thing came out, or the fact that we had some other things in the bag, although I really don't think that - I really have - it's hard to assess how much that contributed to it. Be that as it may we had a bag we were jettisoning this morning that had one of these canisters in it and it had

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four gloves in it - four EV gloves. Two down the side and two in the top, and the thing got jammed in the trash airlock. And as you know, we need the trash airlock very badly, not only today but for the rest of the mission. The basic place it got jammed it turned out that - and by the way we have duplicated the jam on the ground over in the trainer in Building 5 with the same configuration and under essentially the same circumstances, and best we can figure the - this canister, which I described as about that long and about that big around, it has a round lip on one end that sticks out about that far all the way around it. And the lip - it goes around the circumference of it, and it's about that wide. Now at the bottom of the trash airlock, there is a - not a narrower orifice but a rim where the outer door seats when it's closed - fully closed, and this rim has a little - it goes in a little bit on the sides right down there at the bottom. In other words if you were to look at it it would come in like this and there would be a slight ledge there. And it appears that this charcoal canister - the lip on this canister got caught on the lip on that edge, and of course, with the plunger pushing down on it the thing became wedged in the airlock. The crew was able to free it by exerting some amount of force. And Pete didn't say how much but I can imagine how much, on it.

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HUTCHINSON Of course, with the plunger pushing down on it, the thing became wedged in the airlock. The crew was able to free it by exerting some amount of force. But I can imagine how much, on the outer door. And the outer door, of course, would come down and impinge upon this thing that was stuck part way out. And they were apparently - I suspect that they lifted the plunger up, put some force on the outer door, and were able to shove the thing into the center of the airlock and on out. And we were probably very fortunate in the fact that it was apparently hung. The lips had hung together on the same side as the outside door. So we were able to bang it off the ledge. There's a lot of suppositions in that, as to how accurate a description, that is. But based on what we're able to do and see over in the trainer, that's the best we can figure now. You've probably heard some talk since then about urine separators. As soon as this happened, the next thing we began to ask ourselves, well what else have we got going out that thing today, that's bulky, and stands a chance of - in any way, shape or form of jamming the airlock. And the only other big hard solid metal object that we have that we throw away in deactivation, are the urine separators. Now food overcans - there, you might say that's another one - they're metal objects and they're big, but they're long and cylindrical, and there's no way they can get sideways in the airlock. Even if they hung up on the lip, you can back them - There's no way they can jam in there sideways and you put several of them - bind several of them together so they make a nice neat cylindrical package. After a lot of talking about it, and we ran a whole bunch of them over here in the trainer in building 5, successfully I might add, there were several ways we could get the urine separators out of there, and it turned out that the slickest way was to take some of the joint observing program summary sheets, which are the Apollo telescope mount, those big - great big sheets which have the observing programs on them. They're made out of that - I don't know, it's some kind of flight-qualified paper-like material. It's almost like hard plastic. Wrapping those around the urine separators so it made it a cylindrical pack - well a rectangular package that couldn't tip sideways. And it pretty much eliminated all of the sharp edges out Now, the urine separator's about like this - like about - like this - like about- like about that wide, and it's got lots of little appendages and things out. Anyway, that worked fairly successfully. However, to preclude any possibility that we might mess up the airlock, we have chosen not to jettison the urine separators, and instead we have removed them. And our old friends, the corollary guys, who seem to bail us out regularly, bailed us out again. We used one of the T027 - the T027 canister, which is a big canister, which had the T027 experiment in it, that, of course we've - run, and are bringing home. And we've put the separators in there. And you just heard a conversation about them. The crew was trying to pull a vacuum on that. We would have preferred that we would have kept them in a vacuum. However, nobody's really concerned about them not being in a vacuum. So we have them stowed in there and that's where we're going to leave them. And, I suspect, that we'll develop some slick method to package them cleverly so there's no way they can hang up, and use it on later missions. Other than that, the day today was completely normal. And I don't have anything else.

PAO Okay. We got questions?

QUERY Was there any damage to the airlock itself?

HUTCHINSON Well, John. The best we could - Pete did say - I wouldn't call it damaged. He did say that they inspected the inside of the airlock, fairly carefully. And that there was some scoring on the sides and on the lid bottom. Now the O-ring that seals the outer lid, we checked that, and verified it over here in the trainer when we were banging the - attempting to jettison some of the trial runs we made over here. The O-ring seal around the outer side is protected from the - It's actually down underneath, kind of a lip arrangement. So, when you bang something with the outer door, it doesn't damage the O-ring. Now, of course, there is a surface that you can't see, and that Pete can't see. And that's the surface that that O-ring sets on, which of course was exposed when we were having a problem. The fact of the matter is, that except for a short periods of time, that thing doesn't have to hold a very good seal, the outer door. Because the only time it's exposed to cabin is when you've got the thing open, stuffing a bag in it. And I think everyone is - of course they've used the airlock several times since then - since the jam up, numerous times. They're using it continually all day today. And, I think everyone's convinced that we didn't do any damage to it.

QUERY When do they put the blood, urine and feces samples on board?

HUTCHINSON Tomorrow morning.

QUERY I mean, how long before they take off?

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HUTCHINSON It's about an hour and a half in the morning, tomorrow morning. So that would be like about 3 or 4 hours before they leave, before they undock and that would be all - add up all the time and I believe the constraint is something on the order of 12 hours from the time they take them out of the freezer there, until the time they get them into the freezer on the ground. I'm not quite sure about that tot - total length of time. It's something like that. And that - that tags up.

QUERY Neil. What are some of the very specific things they're going to be looking at on the flyaround, other than the wing and the parasol? Are they going to look at even more specific things than that?

HUTCHINSON Boy, I - I don't know - -

END OF TAPE

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QUERY - - wing of the parasol, taking a look at even more specific things than that.

HUTCHINSON Boy, I don't know anything in particular Bruce. The flyaround was a preplanned mission thing to go around and give everybody one last good look at the cluster. I think one of the obvious things we're going to be taking a good look at is the parasol, I'm sure of that. The fly around is being conducted in a nominal manner with no particular instructions to the crew to look at anything specific. And that's about all I can tell you. We're just going to get a good over all look at the vehicle. And there really isn't anything specific that they have asked them to look at.

QUERY Well, unless something else happens, is there anything left, any problem left in the Skylab that you're concerned about as regards to the next mission coming up?

HUTCHINSON No, I don't think so. I think the close out, if we hadn't had that little glitch with the airlock this morning, the close out was completely normal. Of course it is not quite finished yet, they're just finishing up the water system right now. And there is nothing that I can think of. We are leaving with effectively no troubleshooting undone, none of the instruments malfunctioning. Of course you know we're still are down about 25 percent over all electrical power, but there is nothing we can do about that. I really don't think - there certainly aren't any biggies.

QUERY - - coolant loops even though they are going to be shut down and all that equipment is going to be taken off them?

HUTCHINSON Well, they are not going to be shut down, and most of the equipment will not be off them of course. The kind of equipment that is going off the coolant loop mainly are things like - well really not hardly anything. Most of the electronics modules stay on. Of course now that we have one of the solar wings out in the airlock, all that stuff stays on, all those batteries stay on, the coolant loops stay up and running. Of course as you know, we still have a valve in the secondary airlock module loop which we think is stuck. However, it is stuck in a very convenient place. And we don't plan - of course we aren't planning on doing anything about that, we're not planning on changing the loop configuration or anything like that, so that is correct, what you said essentially.

QUERY There is nothing during that month that will be sitting there without anybody aboard. You don't anticipate anything going wrong from some of these problems that you've had earlier?

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HUTCHINSON We sure don't.

QUERY How about the gyros, you're not even worried about having to mess with those that month?

HUTCHINSON Well, I think we're going to have to babysit them a lot, Bruce. But as you recall, the unmanned phase has no maneuvers. And the gyros have historically given us problems, serious problems during maneuvers. Now these drift updates that we're continually doing, we don't really consider that to be - I mean it is a nuisance. But it is something can be handled pretty coherently with the kind of station coverage that we have. Nothing really, though.

PAO Okay, thanks a lot.

END OF TAPE

SKYLAB NEWS CENTER
HOUSTON, TEXAS

CHANGE OF SHIFT BRIEFING
JOHNSON SPACE CENTER
JUNE 21, 1973
4:30 A.M. CDT

PARTICIPANTS:

DONALD PUDDY, FLIGHT DIRECTOR
DAVID GARRETT, PAO

SL-II PC-68A/1
Time: 04:30 CDT
6/21/73

PUDDY Okay. Well basically, it was a very quiet night. The crew went to sleep last night about 5 p.m. per the flight plan. They got up this morning about 1 a.m. which they had talked about. We weren't positive they were going to do it, butit was about an hour earlier than we had planned and we think in the back of their mind, their objective is to get to bed early tonight. And - when I left the control center we were still trying to figure out just exactly where they're at in the checklist, but if we can put it all together, they're already well ahead of where we expected them to be. So I have a hunch they're going to have a pretty good night's sleep. We had projected that they would turn in around 2:30 this afternoon, get about 5 hours sleep before they started their preps for entry. But I think they're going to get considerably more sleep than that. They had about 11-hour work day and I have a hunch, just as we've talked before that their increased efficiency and having everything laid out just exactly what they're going to do, I think that, combined with getting up an hour earlier, they're going to get quite a bit more sleep than we planned. Splashdown of course is still scheduled 8:50 central daylight time, 830 miles southwest of San Diego or just off of Baja. As far as the temperatures, we always got to mention those - we're up to about 80-1/2 degrees now in the gas temperature which is about a 3/4 of a degree increase over what I talked to you about last night. I should mention that we are getting close to the maximum Beta angle. Right now we're running around 7 minutes darkness per rev and within the next 4 revs we're going to be in the case where we have no darkness. And that's going to exist for a while. Temperatures will continue to climb during the time frame where we're at, the maximum Beta angle will probably peak out somewhere around 85 degrees and then of course will start the decay and come on back down the regions that we've previously experienced with low Beta angles. We do get some increase in temperature at the higher Beta angles; that's expected. But most of that increase comes in the last few degrees. We're right now - I believe it's 68.8 and as soon as we get dropped down below 60 degrees - well, those temperatures start to fall off pretty fast. As far as the time line for tomorrow, it's just exactly as publicized premission. No major changes. All the systems look very good. The crew seems to be in excellent spirits and I'll open it up for questions.

PAO All right. If you have a question, would you come up here. We don't have anybody to handle the mike.

QUERY I guess the question is, are you satisfied with the position of the parasol right now? Do you think that will need further adjustment?

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PUDDY Right now, from the information that we have, I'd have to say that we're satisfied with the position of the parasol. It's very hard to determine, based on short-term data and considering the fact that we do run into a significant change in thermal characteristics due to this last few degrees Beta change, but in general, I feel like the position on the parasol, as we now have it, is adequate. It will be looked at throughout today and of course the early part of tomorrow morning. But I don't expect that we're going to change the position of the parasol.

QUERY Well, the only - that sort of strikes me as kind of maybe a partial gamble anyway. If you - because the crew is leaving and you're not going to be able to do anything with it for a month if it should turn out not to be just slightly right.

PUDDY Well, I think if it's just not slightly right, there's still - you might have a localized hot sot - hot spot, so to speak, but we had a localized hot spot anyway. So as far as we can tell right now there is nothing of significance that's going to show up regardless of the Beta angle. It's a consideration right now. In other words, what I'm trying to say is, the Beta angle clouds the issue somewhat. But it hasn't clouded it to the point where we feel like there is any significant problem with the present positioning of the parasol. Now I think we found out, and I indicated to you last night, that if we'd left it I think it was around 25 - 28 degrees somehwere around that region, if we'd left it that far off, yes, in general, that would have created over a period of time an overall temperature increase in there that we would not like to have had. But at its present position, about the only thing that we've been able to note is that during the night time frame, when the crew has turned off the lights, deactivated some of the equipment and so on and so forth, that temperature has not decreased as much as it had originally. But we account a portion of this to be attributable to the increase in Beta angles. So I do not believe that during the unmanned period, we're going to see any significant change whatsoever in the two positions.

QUERY Okay. What about the further results possibly on the trim burn which is supposed to adjust the orbit for the next crew. Have you gotten any recent updated extrapolation on that?

PUDDY As far as we know right now, that burn is going to be very satisfactory and we will be right where we would like to be for Skylab 3.

QUERY Are there any - -

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PUDDY - be very satisfactory, and we'll be right where we would like to be for Skylab 3.

QUERY Are there any spacecraft systems that you are the least bit worried about for the unmanned period?

PUDDY No, not that we're worried about. We are aware that there is - in the rate gyro system, we're going to be faced with a continual management problem. We still have the drifting gyros. And to maintain complete redundancy and not to use additional TACS gas, we will go through drift compensations and minimizing the integral difference between the two rate gyros. In other words, just maintaining those so that we don't fail a test limit and actually go to single gyro and then run the risk of going to no gyros and having the CMGs do a reset routine. But, that's strictly a management problem - is one that we've been faced with prior to the crew getting there. It's one that we've been faced with while the crew has been there. The ground is taking care of that during that entire time frame and it's just a management problem. But it's not one that we're extremely worried about. Just to where electrical power - there's no problems there. And of course, the ATM experiments are performing properly, and we will be continuing around 16 hours per day worth of active support in those areas - on an each-day basis. Of course, we will be manning around the clock.

PAO Tom? Art?

PUDDY Other questions?

QUERY I was going to ask about the - how the battery that got pounded is doing today?

PUDDY Like a charm. You know, just - you hit it once with the ole' hammer and the contactor closes and that's it. It's worked just exactly like any of the other CBRMs every since that point in time.

QUERY That's it for me.

PUDDY Let me say one closing remark. I do have the data with me. I talked to you last night about giving you a detailed description of - of the experiments - as far as accomplishments. It does get rather detailed and let me just say that I have the information available, and if anyone would like to have it, on any particular experiment, or on experiments as a whole, I'll be glad to go over it with you after this conference. But as far as going into a long detailed analysis right now, I don't think it would be worth it.

PAO Tom, evidently had a question.

QUERY How did they get so far ahead of the schedule - haven't left anything out - but they're just working hard?

PUDDY Well, like I say. They got off to an hour

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early start. And, as I have pointed out to you, also, in the last couple of days I think we've seen a very marked increase in crew efficiency. Everything they're doing is being done just a little more rapidly than the premission tests that we ran on these things would indicate. And those two factors coupled together, I think, have put them considerably ahead of the - what we expected as the timeline today.

PAO Fine. Thank you, Don.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 20, 1973
2:22 p.m. CDT

Participants:

Neil Hutchinson, Flight Director
Phil Shaffer, Flight Director
Terry White, PAO

SL-II PC67A/1
Time: 14:22 CDT
6/20/73

PAO Okay, let's get rolling. Change of shift press conference, Neil Hutchinson and Phil Shaffer. Neil.

HUTCHINSON The crew spent most of the day sort of doing separate tasks getting ready to finish this thing up. The crew, as you know, has spend the entire day today - or most of the day except for a medical run this morning, stowing the CSM. And as you probably have gathered from listening to the air-ground, they're busy. They're not having any problems and they're not doing a lot of talking. On the ground today, the team that was on, my bunch of guys, spent most of the day working on minor modification to the deactivation checklist. And Phil's people were on working on minor modifications to the CSM part of the entry which they fly. We haven't got any big diddies going. The workshop closeout we expect to pick up with it first thing in the morning and move right on through it. The modifications, most of them were in the area of stowage getting everything in deactivation exactly straight. There were a few minor things in the circuit breaker area. As far as things we've solved today, we didn't do a lot on this shift working problems. We did turn on - we did have the crew check the MDA port heaters and discovered that circuit breakers were out and were fairly certain that they were inadvertently opened yesterday. And we put them back in and turned on the MDA port heaters, those are the heaters around the tunnel area, and they worked fine. We ran a little procedure today to equalize the pressure in one of the RCS quads with the pressure in the propellent storage module in the CSM. We literally just opened a path between the two and - because we had been experiencing a little high - little higher than normal temperature in Quad A, and it had the pressure in the tank up in the CSM RCS. We've got the last instrument in the minus-C SAL. S149 is in there, we ran a power check on it this afternoon and it's all - looks like it's all squared away. Tomorrow we'll actually open the canister and try it one time before the crew leaves. And I haven't got a heck of a lot more to say. I guess I just like to let Phil kind of give a little summary and then we can talk about deactivation if you like, or whatever.

SHAFFER My day was very much like Neil's, just pointing toward the other vehicle - minor checklist mods and data generation that is applicable to the activity Friday in bringing the guys home. There's a lot of support needed that needs to be generated. Reviewing our time-lines and just getting everything pulled together with the checklist in all we didn- we didn't solve anything either.

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Except that - -

HUTCHINSON Didn't have anything important to solve.

SHAFFER Yeah. Already stole - you stole my thunder on Quad A. But tomorrow will be much busier because we'll be finalizing data tomorrow and getting prepared to - to load it on the spacecraft. Preliminary (garble) reentry solutions and that sort of day. There's nothing new about it, it's just it's time to do it tomorrow with the freshest radar tracking data, freshest weather forecast, that sort of thing. Bring them home Friday.

PAO Okay, wait for the mike and questions. Tom Otoole.

QUERY Can you give us some idea of what - how much work is involved in stowing the CSM? How many different trips they might have to make back into the CSM, how many items they're carrying back there and things like that?

HUTCHINSON Well, first off Tom, the stowage really of the CSM really started in earnest after the EVA, and we took all the ATM film up there after the EVA. And today - -

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HUTCHINSON -- in earnest after the EVA. And we took all the ATM film up there after the EVA. And today, this afternoon, and I don't recall how long it was in the flight plan, but I think it was about 4-1/2 hours this afternoon, the CDR's entire afternoon and about half of the other two fellows afternoon was spent and is being spent in stowing, transferring and stowing everything else except the perishables, the stuff that's still in the refrigerator, the chiller and the freezer. And in terms of how many trips - I think, I couldn't even give you an estimate because it all depends on - you know it's like as if you were packing the trunk of your car, you know you may get this little thing in and decide that it didn't fit and you take it out and set it aside and you want to go down and get something else. It's pretty much a - although it's very well planned it's a time consuming, not particularly hard work but just a time consuming task that has to be done fairly carefully because it is fairly full of stuff. I don't know how many trips. We're taking all the film is going up there this afternoon and all the cassettes that we've exposed, like T027, the S183 film, all the EREP mag tapes, and the EREP film. I wish I would have brought my day - there is a list of things if you haven't seen it, it's floating around, day 27 transfer list it's called. It will give you an idea of the amount of stuff that we are putting in there. We finish it tomorrow. And tomorrow there is probably an hour and a half total worth of work, as far as stowage goes. It's pretty much done today.

QUERY One more part of that. What is still left in the refrigerators and the freezers?

HUTCHINSON All the urine samples, blood samples, ED31, the student experiment of culture growth, the blood samples, the cultures that the crew has taken, like a throat swab here and there, the air samples, anything that is biologically active.

QUERY When do you load them? And are there freezers on the CSM to keep them?

HUTCHINSON They are loaded tomorrow, I'm sorry, Friday, the morning of retrofire. And there is no refrigeration capability in the CSM. However, we have a little thing like is typical of your hamper. You know these things you can buy that you freeze and they have a gelatin inside of them. These actually don't have - in fact I'm not sure what they have inside of them, but they have some kind of material that provides a heat sink, and it is actually like dry ice, but they are not really, but that kind of a concept. And

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they go in the packages that the stuff is packed in, and they keep it cool enough for the return trip until we can get it into refrigeration facilities on board the ship.

SHAFFER These samples, particularly the blood and urine samples go into a highly insulated box, a good many of them. The time constraint that the reentry - the deorbit, reentry recovery sequence goes against is 30 hours from the time those samples are removed from the refrigerator until they are placed in a refrigerator on the ship. And they use the heat sinks that Neil has talked about plus the insulated containers to provide that 30 hours.

HUTCHINSON One thing you might have heard a lot of conversation about - you recall that we didn't take the IMSS, which was the refrigerated, the nice - I don't know what it is made out of, but the highly heat-resistant container that was to carry a lot of the blood samples and some drugs and so on and so forth. And we built one out of food over cans, heat sinks and towels, and some other things, all wrapped around in a bundle for bringing back the ED31 and some blood samples of some things like that which were going to go in the IMSS, which wasn't flown.

QUERY You might have mentioned this before I arrived, but are they ahead of the time line as far as stowage is concerned?

HUTCHINSON If I had to guess I'd say yes. They have been - we haven't presented them with the question and they haven't volunteered exactly where they are in the stowage. But due to the fact that we haven't been getting a lot of questions today, I would guess that they are moving a long fairly comfortably. I would expect - -

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HUTCHINSON - - presented them with a question and they have volunteered exactly where they are in the stowage. But, due to the fact that we haven't been getting a lot of questions today, I would expect they're moving along fairly comfortably. I would expect they're probably a bit ahead.

QUERY Can you run through the deactivation procedures of tomorrow's closeout of the various - various systems?

HUTCHINSON Well tomorrow is basically a day of finish-up-the-housework type of thing. We do things tomorow, like we biocide everything, literally, with disinfectant. We take the trash airlock almost apart, take the liner out and biocide it. We change out the urine separators, and then don't use them any more, they are then collecting urine in big bags. We change out all the filters in the vehicle, like the canister and the mol sieve, the odor charcoal filter in the waste management compartment and the overhead. The one in the urine feces system, all the filters everywhere. The one big system that gets shut down tomorrow is the water. And we draw some water for use in the last day, for use in the CSM, for reconstituting food and stuff. And then the water system is turned down tomorrow. On Friday, the 5 hours that we spend in the workshop, Friday, is when we do the meet of literally turning out the lights and closing the door, you know. Friday, all the final circuit breaker configurations are made, the thermal control systems off, the O2-N2 system is turned off Friday. The lights are put out, and you close the door and leave. But the big system stuff is Friday, except for the water system.

PAO Any further questions? Mary Bubb.

QUERY Could you tell me in - in retrospect, looking back on the mission, how would you compare this 28 days with some fairly horrendous problems, compared to, say, one of the Apollo missions, from the flight controller's point of view?

SHAFFER The first 10 days of this duty, or the first 2 weeks of this beauty was very much like Apollo 13, where you had a tremendous amount of innovation to do, a tremendous amount of flight planning to do, a mission plan to rebuild. And a tremendous amount of analysis to find out where you really were and where you could go from where you were. And that load has continued to decrease as we learn more about where we were, and as we got the TACs consumption under control and as we got the solar wing out, and got our CBRM fixed, and got S019 fixed, changed out some cameras in the ATM, and got the EREP calibrated, and began to learn about the thing. The last week of this period to date has been very much, I guess, like I expected it to be, without the problems we had in the beginning.

HUTCHINSON Yeah. I'd second that. I think we've kind of settled out here towards the end into fairly much a standard routine. I think, if you look at the kinds of things that we done, however, we've done a lot more fixing than you might have expected. And I think, maybe, that's going to taper off, too, because we now pretty much know how most of the experiments run. There are some, of course, which havent been run on this mission that will be new to us the next time. But the big fixing, like trying to get the thermal problem and trying to get the electrical power problem and understanding how the attitude control system works - those are all over with and, theoretically, we won't have to do them again. I would - certainly the work level that has been maintained here over this last month is more inten - considerably more intense than in Apollo - regular Apollo mission. I don't think there's any question about that. Even after we've pretty much got things under control. Now, that may be because I compare it to a later Apollo mission in which we really knew an awful lot about what we were doing. We were sort of repeating what we had done in the past, as far as flight control goes. And we've treaded over an awful lot of new ground here in the last month. I would certainly hope that the work level for a 56-day mission is not as - -

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HUTCHINSON We treaded over an awful lot of new ground here in the last month. I would certainly hope that the work level for a 56-day mission is not as intense as it was in this one.

SPEAKER I'll second that. (Laughter).

PAO Any further questions? Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Medical/Recovery Press Conference
Johnson Space Center
June 20, 1973
10:38 a.m. CDT

Participants:

Dr. Royce Hawkins, Deputy Director for Medical Operations, JSC
Donald Stullken, Chief of Recovery Operations, JSC
John McLeaish, PAO

SL-II PC-66A/1
Time: 10:38 CDT
6/20/73

PAO Okay. We're ready to start this morning. This morning we have with us Dr. Royce Hawkins and Dr. Don Stullken. Dr. Hawkins from the Life Sciences Directorate, Dr. Stullken from Recovery and Flight Operations. We'll open with Dr. Hawkins, who'll bring us up to date on the medical status of the crew and then switch over.

DR. HAWKINS Well I think this is a - kind of the third type of get-together we've had on the medical experiments during the mission. And, as of this morning, we have completed the last of the medical experiments for Skylab-II. That was the pilot's last M092-171 run. And the final blood draw for M110 on all three crewmen. I think that all of the experiments have gone very, very well throughout the mission. We have had no major failures in any of the equipment, the hardware. The crews have performed exceptionally well. And I don't think that we have lost, through data dumps and data tramissions, very much of the data. So I feel very good at this point in time. Now the results of the studies to date, I think in general, show that the three crewmen are in good health. And there have been some changes, particularly in the M092 studies that we noted earlier. And there has really not been any appreciable change in the results of the crew's performance of the M092 since the last report, except for the fact that Dr. Kerwin, on his last run, did have to terminate after 7 minutes at the last minus 40 millimeter exposure. He, in other words, he did begin to experience some presyncable symptoms and had to terminate that run, as I say, after 7 minutes. Now his first similar experience, as you may recall, was on the - was on his third run - M092 run. And then this on his last run. Now Paul Weitz was the other crewman that experienced similar results. That was on his 5th run that it first occurred. We did not see that occur on his last run, today. And, you will recall, there were no - there were no changes in the profile for the commander, Pete Conrad. Now M171 - let me say there that that has been right down the line since the initial, you know, phase of the studies were out of the way. That was when we were in the thermal heavy workloads phase of the mission. And we were seeing a lot of learning process here with how to ride the bicycle ergometer. They were having trouble with their restraint harness. So after they finally got over all that, then they began to settle down and were actually working within the preflight base-line envelopes. And they have remained within that envelope. And we have not seen any significant changes or deviations in that experiment

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results. The 133 sleep studies have gone very, very well. We are somewhat behind in our data analysis of that study. It takes quite a long time to actually go back and analyze 8 hours of sleep data and so it'll be a while before we really have - really have all of the - -

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HAWKINS - - of that study. It takes quite a long time to - to actually go back and analyze 8 hours of sleep data, and so, it'll be a while before we really have - really have all of the results in hand and understand what it really means. The 131, another very interesting study, as it has turned out. The crews have performed at levels far exceeding their baseline, established preflight baseline levels, for the motion sensitivity. And this is all on a positive side of improvement, if you will, where at 15 RPM for the space pilot - science pilot - and 20 RPM for the pilot, which was our baseline acceleration levels. In - in flight they were able to increase that to the final run, which was made at a 30 RPMs for each man. And still they were able to conduct the 150 head movements without any symptoms whatsoever, or motion sickness. So that is something that we're sitll looking at and trying to - to understand exactly what - what process is taking place here within the vestibular and central nervous system. I believe that pretty well generally wraps up the - the studies where we are.

SPEAKER At this point, why don't we have Don Stullken talk about Friday's recovery operation.

STULLKEN Okay, I'm sure most of you are familiar with the Apollo recoveries that we saw many of over the past 6 or 7 years. And as you well know the command module for Skylab is essentially the same as the Apollo command module. However, you will notice a pretty remarkable difference in the overall recovery plan for Skylab. In Apollo, you'll recall, we located the command module, the swimmers went in the water and put a flotation collar on; they then opened the hatch and the Apollo crew came out of the command module into a boarding raft and then the EGIL flew back over and picked them up in a retrievel mat from the boarding raft and flew them back to the carrier. We will not do that on Skylab. Instead, on Skylab the EGIL will deliver the swimmers to the command module; they will put the collar on. And while this is going on, the ship will commence its approach to the command module and the command module will be retrieved with the crew inside. They will not be picked up by HELO. Now the reason for this change is fourfold, really. In the first place, Dr. Hawkins and his people have levied a requirement on us in recovery to deliver the flight crew to the Skylab mobile laboratory as soon as possible after splash, and hopefully in less than an hours period of time. So we're interested in getting them back aboard as expeditiously as possible. Secondly, a part of the same requirement is that the crew shall be subjected to a minimum amount of exertion or exercise

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during the retrieval process. Thirdly, we must have a capability to retrieve them in a supine position; laying flat on their back. All three of these requirements for retrieval of the crew can best be met or satisfied by retrieving the crew in the command module. Then we have an additional requirement that's somewhat different from the Apollo program in that there are a multitude of items in the command module, including biological specimens or biomedical specimens of different kinds, magnetic - -

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STULLKEN - - command module including biological specimens or biomedical specimens of different kinds, magnetic tapes containing data, film cartridges containing data, all the experimental results that are returned in a hard form. In other words, not by telemetry. They are brought back in a command module, need to be retrieved as quickly as possible, and some of these experiments have rather critical elapse time/environmental constraints. In other words, from - they have to be maintained at a certain temperature. And of course as soon as the command module lands on the surface of the water, it is powered down. And you don't have a capability of running an incubator, of running a refrigerator or a freezer in the command module after landing. Therefore, we want the access time to the experiments, the experimental materials, in the command module to be as short as possible. And once again, to retrieve the command module as quickly as possible, which can be done if we picked it up with the crew in it, we can satisfy that constraint. We will continue to maintain the option, and the training has been done. But, if under certain circumstances it becomes expedient to go back to the "old or Apollo method", we can pick them up by helicopter in the retrieval mat, either in an upright position or supine if that's required. And the recovery forces have been trained in both methods of retrieval. But if conditions are satisfactory, as we expect them to be, the preferred method of retrieval will be the flight crew in the command module. On Friday, the command and service module will separate from the workshop at about 09:40 Zulu. There is a shaping maneuver at 10:05, and the main SPS deorbit maneuver is conducted at 13:11. All times are Greenwich mean time. After the SPS maneuver, some 25 minutes later, the spacecraft will have entered the Earth's atmosphere and blackout begins. Blackout lands for about, or lasts for about 4 minutes to 13:40. At 13:44 the drogue chutes come out, 13:45 the main chutes come out, and at 13:50, specifically at 13:49 and 57 seconds, the command module should land. The location of that landing, according to the last trajectory update we had at about 8:30 this morning was 24 degrees 47 minutes north longitu - latitude, 127 degrees and 5 minutes west longitude. There is some tenths of degrees or minutes tacked on to that, I didn't even bother to write them down. I should point out, since we always get asked it later on - how come it didn't land at exactly those coordinates, that those are the coordinates where the main chutes come out. And if there is any wind blowing in the area, it is going to drift on the mainchutes away from that. But that's

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where it is targeted for main chute. If there were no wind situation and they dropped vertically from that point, then they should land at that point. Arrayed around this target point that I just gave you will be the recovery forces that will be very similar to the ones that we saw in Apollo, except that they'll be arrayed slightly different around that targetpoint. The high probability landing area for an Apollo lunar return was a circle. It had a 5-mile radius, and we keep all of the recovery forces out of that - you might say the bullseye of the target, for obvious reasons. The high probability landing area for Skylab is not a circle but rather an elipse that is 4 miles radius in its along-the-track side and 7-mile radius cross track. This doesn't really make much difference. But the ship will be located on that - -

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DR. STULLKEN - - and it's almost 7-mile radius cross-track. This doesn't really make much difference. But the ship will be located on that ellipse, on that - roughly within 45 degrees of the windline, downwind of the target point. The reason for that is, - the ship, of course, doesn't go dead in the water at the time of landing. He keeps his speed on and he keeps his boiler up so that, you know, when he pushes the throttle, it goes. He'll be traveling at about 20 knots and he will maneuver his ship to cross that line, that imaginary elliptical line around the target point, going into the wind at the time the main chutes open. And then as soon as we get a splashdown point, he will begin to slow his ship and adjust the arrival of the ship at the splashdown point at the command module to be at about the same time that the swimmers have completed putting on the flotation collar. So as soon as the flotation collar is on and inflated, the ship should be in its final stages of approach and probably within 5 or 10 minutes of that time, the shot-line from the ship will go to the command module, the inhaul line will be fastened, the command module will be plumbed underneath the B and A crane on the ship and it'll then be hoisted aboard the ship. Now also, on that ellipse around the target point, there will be 3 helicopters and they'll have the following call signs which you may hear. Photo-helo, it's pretty obvious what that is. That carries photographers, and the live television camera will be in the photo-helo. The recovery-helo is the one that will deliver the swimmers to the command module, put the flotation collar on, first the seaanchor, then the flotation colar. And if required, will be the one that would pick up the astronauts. The third helo on that elipse what we call ELS, that stands for Earth landing system helo. We have a requirement to retrieve all three main chutes. The ELS-helo will have three teams of two swimmers each, or a total of six swimmers. And it - as soon as it arrives in the vicinity of the command module, it'll drop one team of swimmers at each of the three main chutes. Then they will bouy those main chutes up, so that they can saved and brought back. And who goes in first with what team of swimmers is the function of who gets there first and what the wind direction is. Under no circumstances do we permit the recovery of the Earth landing system to compromise the recovery of the flight crew or the command module. But if everything is going great, and there's no reason to believe that there's a problem with the crew or the command module, we might delay the recovery-helo going in to deliver the swimmers to the command module by 34 or 40 seconds, whatever it takes the ELS-helo

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to get in there and drop swimmers on the chutes. Because they don't float. They sink. And unless we get swimmers to them, depending on what the sea-state is, if it's a flat calm sea, the chutes will float for maybe 3 or 4 minutes or more. And if it's a rough sea the chutes will go down pretty fast. So, exactly what the sequence of event - what helo will go in first and so forth is a function of the on-scene situation at the time. And all of this has been discussed in great detail with the pilots who are flying the helicopters, and the swimmers, the task group commander, and so forth. So they know what they're going to do. The swimmers will put the flotation collar on the command module, as I said, and then the ship will come on in and make its apprach. The option for the helo retrieval might be exercised under the following circumstances. If for some reason or other, the guidance and navigation system of the spacecraft do not perform properly, or malfunction, and we had a significant miss from the target point, like maybe 10, 15, or 20 miles, then the time it would take the ship to get there would exceed considerably, the time we could get the crew back, if we went ahead and picked them up by helo. So under those circumstances, we would probably pick the cr - -

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STULLKEN -- to get there would exceed considerably the time we could get the crew back if we went ahead and picked them up by Helo. So under those circumstances, we would probably pick the crew up by helo and bring them back. Another situation that might dictate the use of or exercise the option of the helo retrieval would be some bizarre or unusual combination of wind and sea state. You know a big ship like Ticonderoga doesn't maneuver like a row boat. And there are certain combinations of sea state and direction and wind speed and direction that make it difficult to maneuver that ship. And if in the opinion of the captain of the ship, it would be unsafe or would take too much time to maneuver the ship for retrieval of the command module, at that point he can exercise the option of telling the helos to go on in and pick up that flight crew, and then we'll get the command module as soon as possible after that. These are the two main reasons that we might exercise the option. Now once we get the command module back on the deck of the ship, first thing that will happen is that the flotation collar is cut away, and then it is set on the dolly. And as soon as it is set on the dolly, the recovery engineers will install what we call thruster plugs. They are simply plugs that go into the RCS reaction control system thruster nozzles and are vented over the side of the ship, so that in the event there were some small leak of the hypergolic fuels from the RCS system it would be vented over the side of the ship, and wouldn't be a hazard in the immediate vicinity of the command module. As soon as the thruster plugs are installed we'll move a work stand up to the command module and the recovery team leader and the recovery surgeon Dr. Ross will then open the command module hatch for the first time. Now there is going to be a conference there at the command module hatch opening during which period of time the doctors Dr. Ross and Kerwin discuss and work this whole thing out. And as a result of that discussion, the crew will then either come out of the command module under their own power - that is, they will climb out, stand up, and walk to the SML, or they may elect to put all or one or two of the crewmen onto a litter and maintain that supine position back into the - back into the SML. Now the location of the - SML is Skylab mobile laboratory. I kept using that acronym, in case you are not familiar with it. The Skylab mobile laboratory is located on the hanger deck of the ship just forward of the number 3 elevator, which is the starboard elevator, and the distance from where the command module is located on the starboard elevator to the entrance

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into the Skylab mobile laboratory is probably 50, 60 feet, it's really a very short distance. And as soon as we get them into the laboratory then, then Dr. Hawkin's people take over for the biomedical examination, and we begin the experiments removal and post flight procedures on the command module. I'll turn it back to Royce, and he'll tell you what goes on when we get the crew back in the SML.

HAWKINS Let me back up just a ways here to the point where - just prior to opening the hatch and make sure this is perfectly clear - exactly what procedures are going to be followed. There will be at least a 10 minute period before the hatch is opened while Dr. Kerwin evaluates the condition of the crew, including himself, and he will be in contact with the crew flight surgeon on the outside, Dr. Ross. Now Dr. Kerwin has in the command module a sphygomonanometer and stethoscope. He will check pulse and blood pressure on himself in the horizonal supine position before he gets up. He will then stand and he will also check his blood pressure again. Now all three crewmen will have on the - -

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HAWKINS - - before he gets up. He will then stand and he will also check his blood pressure again. Now, all three crewmen will have on the lower body countermeasure pressure garment, which I think everybody is familiar with. This is the type garment which we flew on Apollo 17 to evaluate the effect. And Ron wore that and he did inflate it after getting on the surface of the water and the - it was maintained inflated so as to provide a countermeasure pressure around the lower extremities and during the time that he was being transported back to the ship and into the medical exam area. Now, the Skylab crew will have those garments on, and they're there for - as a preventive measure in - incase there is a real need to assist them and prevent the autostatic hypertension drop that could possibly be present. Now, it's not our intent to just routinely use those, and that's the reason for this period of - 10 minute period of time to check the crew to see whether they really need it. Now, in all probability they will not need them. And we certainly hope that they don't. We would like to - to get them back into the lab and get them - get the examinations underway without injecting any further deviations in the procedure. But this period of time before the hatch is open will be used to asses the condition of the crew. They will in turn relate that to the flight surgeon outside, and he will conference with Dr. Kerwin. They will make the decision then of what the - the exit mode of the crew will be. Now once they leave the craft, they will then proceed directly into the mobile laboratories where they will begin the immediate post flight recovery examinations. This is a very complete, comprehensive, extensive exams that will last something between 5 and 6 hours. And it will really be that long before we will really have any information back to really talk about. Okay.

PAO Okay, we - let's see - we might have Don just quickly go over the time line back to Houston before we take questions. I think some of the - -

SPEAKER Well, landing occurs local time and the ship will stay on Pacific daylight time, which is 2 hours earlier than it is here. Landing will occur out there at 10 minutes to 6 o'clock in the morning - 10 minutes to 7 o'clock in the morning; 10 minutes to 9 o'clock back here in Houston. And that turns out to be 3 or 4 minutes after sunrise in the local area for the ship, so they'll have plenty of light. The ship will then steam, and we have to adjust the heading of the ship, and adjust the speed of the ship so as not to shake up Dr. Hawkins' very delicate equipment in the Skylab mobile laboratory during the periods of the -

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during the periods of the medical examinations. But the ship will steam back, and will be off Point Loma, which is the entrance to San Diego Harbor, on Sunday morning. And we expect her to tie up at the dock at the carrier piers at Naval Air Station, North Island, at about 9 o'clock local Pacific daylight time Sunday morning. Now, prior to getting into the dock, the R plus - recovery plus - 2 - day biomedical examination will have commenced. And they won't complete that until about noon. And then shortly after noon when that has been completed, the crew will come out, stand on the elevator of the ship, which is now tied up at the pier, and to my understanding there'll be some very brief welcome back - -

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DR. STULLKEN - - stand on the elevator of the ship, which is now tied up at the pier. And, it's my understanding, there'll be some very brief welcome back home, type ceremony at that time, not to last more than 10 minutes or so. They'll then board the helos on the deck of the ship, which will fly them to the air strip, which is all of a 5-minute flight. But it's the easiest way to get them over there. And they'll board the C-141 aircraft at Naval Air Station, North Island, take off immediately. And we expect them to land out here at Ellington at about 6:00 o'clock, betweer 5:30 and 6:00 o'clock p.m. local time, Sunday evening.

PAO Okay. Why don't we open it up now for questions. Nick Chris.

QUERY How high is that boom going to be in the crane that picks up that - the CM? In other words, how much of a distance is it going to have to be raised?

STULLKEN The elevator - the level of the elevator is approximately 25 feet above water level and you've got to get it about 5 feet higher than that to clear the edge of the elevator. It'll be picked up about 25 feet.

PAO Art Hill.

QUERY Dr. Hawkins, I'm a little confused on the MO92 results. It sounds to me as though you might have already considerable individual variation in this, and I'm wondering if this is what you expected and what you might have to say as far as any leveling off process might - might have occurred or not occurred, as the case may be?

DR. HAWKINS Well, Art. We definitely have seen individual differences here in the three crewmen. We have three entirely different results, although all similar in the direction in which they were going. I can't say, you know, how much longer it would take Paul Weitz to reach this second stage, if you will, that Joe Kerwin did or how much longer it would take Pete Conrad to reach the first stage, although he's - they have all, as far as the heart rates, blood pressures, these have remained fairly, you know, fairly steady between these periods. This drop that we saw in pulse pressure, increased heart rate and drop in pulse pressure, on Joe, and then again, in Paul, is really the - kind of the end point, you see, at their limit, that they can go with that level of stress. And there are individual differences. Now, the - outside of that, you know, their performance is very good and certainly nothing unexpected. I don't think that this is really a lot different than what we expect to see. We have seen this in the post flight recovery periods of all of the Apollo flights and in all previous crews, that have shown similar drops in the immediate post-flight examination. And then they returned to their preflight baseline levels within the, usually, 48 to 72-hour period. Now what changes we're going to see in this immediate post-flight, how much difference it's going to be from what we've seen inflight, is yet to be seen.

DR. STULLKEN That's one of the reasons we're flying Skylab.

DR. Hawkins Yes.

QUERY Well, I guess it's the progressive nature of the cases of Weitz and Kerwin that I'm curious about, and I may have this in wrong perspective. But it would seem to me that if, as you continue to conduct an experiment, and it progresses to the point that earlier, and earlier, you reach - you reach a time when you would like to terminate, then if the thing doesn't level off, you would reach a situation where you would say, "You can't stay up there any longer, you'd better come home." That sort of thing.

DR. HAWKINS Well, as I say, I don't know yet what that inflight data really means to us until we have a chance to see what the post-flight recovery data shows us. And what - -

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HAWKINS I don't know yet what that inflight data really means to us until we have a chance to see what the post flight recovery data shows us, and what it really means. Actually I don't think at this time from what we've seen, that we would not expect the crew to be able to continue on for a 56 day mission. Outside of the testing, the test itself, their performance has been outstanding, it's been perfect. And their exercise response and work capacity has remained right on the line, just exactly preflight levels. So again it is what it means to you in that reentry stress period and return to 1 g I think that's really the critical point question right now.

QUERY In the recovery, how long will it be from the time of splashdown, or how long do you think it will be from the time of splashdown to the time they are on the deck. And secondly, what do you attach the cable to or how many cables, just one cable - tell us a little about how you lift the thing up out of the water.

STULLKEN Okay, timeline first. They have been practicing out there - well first of all we did a little Skylab retrieval type practice during Apollo 17. We used Apollo 17 recovery as kind of a test bed for some of our procedures with Skylab, verify that they would work. We have the same ship as you know, Ticonderoga, USS Ticonderoga. And we are very fortunate in having the same skipper of that ship, Captain Norm Green, who is an outstanding ship handler, and has really been doing beautifully. The actual time from splash to SML, which is what our critical time - from splash to Skylab mobile laboratory - is a function of, number 1, where the command module actually lands. If it lands right on the target point that's one thing, it could be any place in that ellipse. Number 2, it's a function of visability. For example, if we got a complete cloud deck out there at say 1500 feet, we could get an RFD up, a radio fix on the beacon of the spacecraft, we can have a pretty good idea of where it is going to land, but you don't commit the ship to run in until you get a visual on it. So we may waste 3 minutes or more 4 minutes before we get a visual fix on it, and we can commit the ship to go in. sea state, wind speed, all of these things will effect it. Now we have seen in practices, using the boiler plate spacecraft out there, times as sure as 35 minutes from splash to the command module on deck when the medical conference that Royce referred to begins. We've seen it go as long as 50 or 60 minutes. But as I say, there are a lot of variables. Okay, the B and A crane, stands for boat and aircraft crane - which is an integral part of the ship and is used for hoisting

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liberty boats and aircraft on board - is fitted with what we call the NASA wench. It's a wench that was originally designed and built to be used on the data crane that was put on the fan tail of destroyers and things like that. It's a specially designed and built wench specifically for this purpose. And the main feature of it is it has a 1-5/8 double-braided nylon line. Now this has a 60,000 pound breaking stregth. Now this double-braided nylon line acts like some tremendously great shock absorber, and we have something like 60, 70 feet of that line from the wench over the ship down to the command module, all of which is going to attenuate the shock at the instant of pick up. The upper deck of the command module is fitted of course with a lifting loop just like it always has been on Apollo. It will be the same lifting loop on the upper deck of the - -

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STULLKEN - - fitted with a lifting loop just like it always has been on Apollo. Be the same lifting loop on the upper deck of the command module, and we have - we supply our own , what we call Apollo lifting hook, which is a specially designed hook that mates with the lifting loop on the top of the spacecraft; that's on the end of the lifting line.

QUERY Where's that loop on this spacecraft?

STULLKEN On the upper deck of - -

QUERY No, no, no. On the spacecraft. Where do you attach that line to the spacecraft?

STULLKEN On the upper deck of the spacecraft, immediately above the - the hatch, in the hatch area. Just behind the guillotine that cuts the - that cuts the risers at the time of landing that gets away. If you look at a diagram of the upper deck of the spacecraft, you'll see that very obvious big loop up there.

PAO Tom O'toole.

QUERY Got a question for Dr. Hawkins. I really don't understand this business about the coming in. You want - why you want them coming in supine? Why are they supine all the time? Why they may have to be littered off, and why you might feel they have to inflate these kind of pressure garments? Would you run through all that in layman's terms and not doctors terms.

HAWKINS Well - - Yeah, I'll try. As - as I think you know the - from the Russian experience, they - they have seen, in the post flight period, with their longer duration flights where the crews were not able to stand and walk after landing, and they did have to be carried out of the spacecraft. This, and in light of the data which we have seen from our Apollo flights , as well as Gemini - in Apollo where we have seen a degradation in the immediate post flight evaluation of the cardiovascular system, where they - this is the use of the lower body negative test where we have demonstrated a difference, significance difference, from the baseline data preflight. And if this progressed beyond what we have presently seen in crews, then it would mean that the crews could experience a simular situation of which the Russian cosmonauts experienced in not being able to stand errect once back in the 1-g environment, and they could pass out. It's a orthostatic hypotension. Now that's what we're trying to prevent happening, and the garments are there to give countermeasure - counter pressure to the lower extremities in order to prevent this pooling of blood in the lower extremities. That's what actually is occurring, and you're not getting enough blood up into the brain. So this - it's just like a - the old G suits used in flying, really. It compresses the - around

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the lower extremities and helps to push the blood back up to the heart and keep it circulating as it should. Now we don't intend to use these things unless there's absolute need for it, but they're there just as a preventive measure, that's all.

PAO Tom Otoole.

QUERY Even if you don't use them though you want them supine. Now why do you want them supine?

HAWKINS Well, they are supine right now; they enter supine. Okay, we're going through a systematic evaluation of the - of their cardiovascular system. Once we have them stable, on deck, where we can check the pulse and blood pressure, and then stand them up and check and again systematically evaluate what their cardiovascular system is. We hope that we see nothing of a drastic change that we're talking about, and that the crew will, of course, be able to walk right out of the spacecraft as they always have.

QUERY One more question. What is orthostatic hypotension?

HAWKINS Well, this is a dropping in blood pressure and - which can lead to syncope. Fainting, fainting. Yes, syncope - -

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DR. HAWKINS - - which can lead to syncope, fainting.

SPEAKER What?

DR. HAWKINS Fainting, syncope - S-Y-N-C-O-P-E. It's just like, I'm sure you've seen this. A good example is in military, where you have troops standing at attention out in the hot Sun for a long time, and suddenly a guy just keels over, and passes out. That's what's -what's happening, that's orthostatic hypotension.

QUERY Because blood flows tothe lower extremities?

DR. Hawkins Yeah, right. That's right.

QUERY The fact that it pulls on the lower extremities, I can understand that they're not used to gravity and like that, but is it because their heart muscles are weak, that the reason they can't - the blood isn't pumped back out of - -

DR. HAWKINS No. It's really more in the periphery. It's of the peripheral vascular system, that you're loosing the return capability of the vessels to get the blood back - the muscles to get the blood back and (garble) you know pumping it back into the - -

QUERY Vessels, I mean, around the blood vessels? They're weak?

DR. HAWKINS Well, I don't know whether you'd say it's weak, they're - there's a change, of course, which is resulting in the inability of the cardiovascular system to compensate for that amount of stress, which they're subjected to under the 1-g condition, or, if you will, in the lower body negative pressure device. Where you're tending to pool that blood, hold it - it tends to draw it down into the lower extremities. And what you're measuring then, is the body's cardiovascular system's ability to compensate for this. And it does involve cardiac output, heart rate and peripheral vascular tone and muscle tone, as well. But I'd, to say no, you use the term is the heart weak? No, I don't think that that's what we're saying at all. That's not the correct terminolgy to apply to that.

QUERY Now, when they're coming in, they're going to be under a force - a maximum force of 3.6 gs even in the supine position. Could this be enough to cause them to pass out?

DR. HAWKINS I don't - I seriously doubt that. Now this is applied transversely, and we have seen the thresh-hold limits on this to be far greater than this g load. So I wouldn't expect this to happen at all. That would have to get up pretty high gs.

PAO David Crain.

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QUERY After listening to the comments from Dr. Kerwin, and the Skylab-III crew last week and their comments, everybody really expects this crew to literally come bouncing right out of that command module. But, even though they do, you're still not going to have any little ceremony on board the ship, like there have been in the past on Apollo, you're going to immediately shoot them into the Skylab - -

DR. HAWKINS Oh, yes. Right.

QUERY There's not going to be any (garble) or any comments or ceremonies there?

DR. HAWKINS No, no.

QUERY Even though, they're happy and chipper?

DR. HAWKINS Exactly.

QUERY You are that fearful , then?

DR. HAWKINS Not fearful. We want to get the crew back and get them under examination, so that we do not lose any of that immediate post-flight data. We want to see them as - just as quickly as we can, in order to see what the - what the immediate results are.

QUERY How long will it be before we start getting results of the blood work and those other analyses?

DR. HAWKINS As soon as we get it back here in our laboratory. Within a matter of 2 or 3 days, we'll start getting some of those answers out. And we have prioritized, the inflight samples, to try to help us arrive at a position where we can give a go for the 56-day mission so that our priorities, as we'll take early samples, med - -

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HAWKINS - - at a position where we can give a GO for the 56-day mission, so that our priority says that we will take early samples, mid-flight samples and late samples and work those first. And then we'll go back and pick them up in between those points. But that's the way we are going to approach that problem because of a restricted time line we're working in.

QUERY Okay, as far as the M092 results and those individual differences, has there been enough variation in the amount of exercise by the crewmen to account for some of that?

HAWKINS I'm not real sure that I can answer that positively. I think all three of them have worked and exercised pretty, pretty rigorously really, and intensionally. And they really worked that bicycle over I know. I guess if I'm guessing, I would say maybe Pete Conrad might have exercised more than the other two. But I don't know that for sure.

QUERY How far will the ship be from the command module when it is picked up?

STULLKEN You mean at the time of lift? The crane plumbs - about 35 or 40 feet from the side of the ship is the point directly below the crane. Yeah, lateral distance from the side of the ship. I'd have to go back to the ship diagram and look at it. I know one thing, if the thing starts to swing as soon it comes clear to the water, the line is not long enough for it to swing into the side of the ship. We checked that out on Apollo 17.

QUERY Two medical questions. Do you know anything about calcium loss in the crew? That's number 1. And why do you think, or why do the doctors think you were not able to induce any motion sickness in any of the crew members, even spinning the chair at 30rpm? It doesn't make any sense, does it?

HAWKINS Okay. No, Tom, on the first question, we don't have the answers on that yet. On the calcium loss, we'll have to wait until we get the samples back into the lab. And of course too, the M078 - that's the bone mineral scans. Those will not be done until R-zero day, so as to get any comparison with the preflight data. Why they did not experience any motion sickness. For one thing I think our measurement was late, our first measurement of this was late. We did not measure - do the first test and measure this sensitivity until the 6th or 7th day of the mission. I think we're - I think we have in the early, very early phases of a mission of zero-gravity exposure - I think you're taking - you're seeing things go through a very rapid, adaptive type of change.

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And the body is readjusting and adapting to that new environment that it is finding itself in. And I think perhaps that this vestibular system is one where you see the changes in those first 2 or 3 days. Now if you think back on our experience of the previous flights, most crewmen have experienced some motion sickness to varying degrees in the first few hours or first 2 or 3 days. There have been very few exceptions. Now then, this crew actually did not experience any, even in the first 2 or 3 hours, or the first 2 or 3 days. And I think that they really expected that they would. We have talked about this and I know Pete has commented on it several times that I have heard him. Okay, if we, as he says if we flip our gyros, that's the way he describes it, then - -

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HAWKINS - - that - okay, if we - as he says if we flip our gyros, that's the way he describes it, then we're going to slow down, we're going to take it easy and we're not going to be able to stay on the time line and we want everybody to understand that, you know. Don't get sore at us because we're not doing the job. So it was - expected or not, anyway, it was known that this was a possibility and that we would be ready to cope with it. Now, the - this crew went through some training with the equipment. And they went through quite extensive training on the head movements in the rotating chair in the 1G trainer, in all preflight. And I think, and here again I don't know this yet for sure and I haven't had a chance to really talk with the principal investigator who's responsible for this particular study, but it's my opinion anyway, that this training - that preflight has definitely given them some protection and trained them against this happening. And I do know that the Russians who have had - apparently have had similar experience, or even worse experiences, with vestibular disturbances in flight than we have, do train their crews quite extensively in a similar manner, and have been doing that for some time.

PAO We have any further questions? (garble)

QUERY In the early phase of Apollo, we were told that it would be too dangerous to recover the spacecraft with a crew aboard. Now what made you change your position there?

SPEAKER Well, things have changed since the early phase of Apollo. You may remember that up through - and I can't remember whether it was Apollo 10 or Apollo 11, the lifting loop on the spacecraft was of inadequate strength and we had to put on an auxiliary lifting loop in addition to that loop. And since that piece of auxiliary equipment had to be installed by swimmers on rafts in a floating environment there was always some question about the integrity of the - of that. Also during those earlier phases we had the - what we call a snatch problem, which is why I mentioned this 60-foot-long 1-5/8 inch nylon. Prior to installing the NASA winch on the ship's B and A crain the lifting - the lifting arrangement was steel cables and if you happened to get into a situation where the ship was rolling away from the spacecraft as it was going down on a wave at the same time you started to winch, you'd get a snatch load on the top of the spacecraft that could exceed the structural strength of the spacecraft actually. It was a combination of all these things. And I hate to admit it but, in the early part of Apollo we, NASA, didn't have the faith in the abilities of the skippers of the ship to maneuver that great iron boat, you know, close enough to do a really good job. We found out that they can - he can maneuver that Ticonderoga like I can maneuver my 16 foot runabout, really. He's got four screws and with the proper training and practices these skippers now get, they can bring that ship dead in the water right alongside of the spacecraft. So it's really been an evolution rather than a change, going from one to the other. There was really no point in pushing the problem earlier in Apollo because it was no urgency to get the command module out. Now there is with all those experiments on board as well as the crew considerations I have mentioned.

PAO Okay, let's take one more question if we've got one and then close it. Nick Crist - cancelled. Okay.

END OF TAPE

SKYLAB NEWS CENTER
HOUSTON, TEXAS

CHANGE OF SHIFT BRIEFING
JOHNSON SPACE CENTER
JUNE 20, 1973
4:30 AM CDT

PARTICIPANTS:

DONALD PUDDY, FLIGHT DIRECTOR
BOB GORDON, PAO

SL-II PC-65A-1
Time: 04:30 CDT
6/20/73

PAO All right, we'll begin our change of shift briefing with Flight Director Don Puddy. Don, you want to give a summary.

PUDDY One thing you probably heard yesterday was that the crew reported that the parasol looked like it might be not completely deployed on one side so we did rotate it to approximately, we hope, 15 degrees. As it turned out it looked like it was about 25 degrees and you may have heard some of the temporatures did go up rather rapidly. In fact, I think we got a 28 degree rise in a couple of temperatures and contacted the crew on it. They'd also noticed it and we did rotate it back about 10 degrees to the 15 degrees that had been estimated originally by the Commander during the EVA that would be required to give optimum thermal stabilization and as it turned out, that's true and the temperatures have started to stabilize although it's still going to be several hours before we know the exact trend. Right now the average gas temperature is running around 79 and a quarter degrees. Food's running around 85-1/2 and film is around 86 degrees, with around 60 degrees in the MDA. Yesterday the crew accomplished a flight plan that I briefed you on yesterday morning. In addition to that, you might remember, we talked some about the fact that they were accomplishing quite a bit of additional activity, and just out of curiosity, when I came on this evening, I tried to get a feel for how much that was, and by our calculations what we estimated it would take the crew to do, they accomplished about 6 man hours additional work. Now, some of that, of course, can be attributed to the fact that they actually went out on the EVA a little early, and of course we had alloted 3 hours on the flight plan to make sure they had plenty of time for the EVA, and of course, they were only out a rev. So some of that is translatable into that time saving, but they did get a lot more done than we had predicted. As you're probably well aware, what we've been doing is sending up each day what we call a shopping list. They had one on board at the start of the mission, which outlined several items if they had spare time, that we would like for them to accomplish, and in addition to that, as each day has gone along and they have accomplished some of those items, and we have seen other items that we would like for them to accomplish, we have added to that shopping list. And this 6 man hours that I was talking about were primarily associated with some of the shopping list items. A couple of additional runs of S183. They went ahead and accomplished the EREP deactivation that we originally had scheduled for today. They also did the IMSS deactivation that we had originally scheduled for today's activity,

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and ran a malfunction procedure on S009. Today the crew got up around 2:15 local. Of course, you're well aware that we do have a press conference scheduled over the Goldstone-MILA pass, which is between 5:18-5:35 local today. The press conference will be followed by the last medical run on the pilot. We're going to stow the S183 that we deployed yesterday and as I mentioned, we did accomplish a couple of runs on 183 that we didn't think we were going to be able to originally. The remainder of today is going to be spent starting the deactivation. Doing what we call the day 27 transfers to the command module, and then inventoring the items in the command module to make sure we've got everything transferred that we want. In addition, we are going to deploy a S149 which is the micrometeorite particle collection experiment - corollary experiment, and that particular experiment will stay out during the time frame between Skylab 2 and Skylab 3. Of course tomorrow is deactivation and we'll talk some more about that tomorrow night. And then Friday, of course is re-entry day. I'll have some more exact figures for you tomorrow morning as far as experiment accomplishments are concerned, but just as a good general statement right now, let me say that I think we're running, in general, around somewhere in the 80 to 85 percent of accomplishing all of the experiments that we wanted accomplished in Skylab 2. In addition to that, of course, as you probably are well aware, we've accomplished several malfunction procedures, done an extra EVA and things like that that were not predicted in the prelaunch, and tomorrow night I will have for you a - what I consider to be a pretty accurate breakdown on each of the individual experiment areas. These have not yet been brought completely up to date as far as each individual discipline. ATM, for instance, is running - just to give you a gross estimate right now - ATM is running around 81 percent. EREP is running around 78 percent. The medicals, in general, are running anywhere from 75 to 100 percent.

END OF TAPE

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PUDDY - the medicals, in general, are running anywhere from 75 to 100 percent. Corollaries are running between 56 percent - for some of them, on up as high as 200 percent for others. In other words, there was a couple - the metal melting experiment where we actually got twice as much as we expected to get on Skylab 2. One other thing - let me just mention briefly. I'm sure most of you are interested in the flyaround. And just a little advance information on that. After undocking, the flyaround will be accomplished and we will be at a distance of something like 250 to 300 foot. The flyaround will be accomplished in the - the - in the XZ-plane, which - our model's gone - I'm sure you're familiar with it - it's 4-1/2 - like so. And that's about all I got. Open it up for questions.

QUERY Don, Joe this morning was a little worried about doing an M171 in something called mode 1 and he was a little - asking about that. What does that mean?

PUDDY Okay, basically what we had done - up until this point in time the M171, the metabolic analyzer runs have - have been accomplished in what we call mode 2, which is essentially - all you're doing is measuring the expired gas through a spirometer. And the mode 1 is essentially exactly the same protocol. The only difference is that you're not only measuring the expired, but you're measuring the inspired. In other words, you're measuring the constituents of the gases that the crewman is breathing as well as the gases that he's expiring. And you can a more accurate correlation. The reason he's a little concerned is - that particular mode on that particular experiment has not in the past been completely successful. And what we're trying to do here is to - our data collection has been good, but we are interested if at all possible, in getting a feel as to whether or not this particular mode on this experiment can be used, and to see whether or not the assumptions that we have been making on the inspired gas correspond with what the experiment - equipment itself will tell us. And that's basically all there was to that one.

QUERY What type of things will have you be transferring today into the command module?

PUDDY I'm sorry - they're - there's a - it's a very long and detailed list, but in general, what you're talking about c ing is - you know - you're transferring experiment haroware - film, various items that we're bringing back - water dispenser that we changed out, the - I think we're bringing back the camera, certainly bringing back all of the experiment samples that we collected during the EVA. Things of this nature. It's a fairly long

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list, and I think to get the exact details, you ought to refer to the transfer list itself.

QUERY Not bringing any sugar cookies back, though.

PUDDY Any what?

QUERY Sugar cookies.

PUDDY No, we got plenty of those on the boat. Pete's already made his promise we got plenty of sugar cookies on the boat.

PAO Tom, you have a question? The mike is in front of you.

QUERY What is the timeline that - of - they're going to be getting into? Can you run over the times they're going to be waking up? I don't quite understand how they're going to - with about setting their watches ahead? That was talked about this morning.

PUDDY Oh, what they're trying to do is - instead of trying - we're - all they're trying to do is get themselves squared away with reference to the clock and local time. Just because of the change in the flight plan. All they're trying to do is to get a Delta from their onboard flight plan. The flight plans that you all have outside - that are sent over here each day will give you the information as far as local time. And all they're trying to do - without us uplinking the site AOS and LOS times - since their timeline is essentially NT minus time, they're just trying to get themselves squared away so they can use their watches to - and their onboard timeline, to go ahead and follow the flight plan. That's all I want to - -

PAO That's it. Gentlemen, thank you.

PUDDY Okeydoke.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 19, 1973
14:55 p.m. CDT

Participants:

Milt Windler, Flight Director
Rusty Schweickart, SL-2 Backup Commander
Terry White, PAO

SL-II PC-64A/1
Time: 14:55 CDT
6/19/73

PAO We ready to go here. Okay. Let's get started. We're going to clip it here, even though it's 2 minutes from LOS. Change of shift briefing with Flight Director, Milton Windler, and Backup Skylab Commander, Rusty Schweickart, who was CAP COM for part of today. And Milt, why don't you tell us how the EVA went from over at your point of view, and Rusty if you have anything to say. And then we'll go to questions.

WINDLER Okay. Well I'll let Rusty go over the details of the EVA. But obviously we had a very good day today. I think that everybody was - they weren't surprised, exactly, but it was so easy when they went out and tapped on that bolt and the regulator came in. In fact, I got a little start. I thought for a moment, there, that the EGIL was telling us that the thing had permanently tripped off, when he was just trying to say that he'd just come - the battery had come off, when he first turned it on, because it was so low in voltage. But, they have charged the battery up and the reg is doing its thing now. And it's cycling normally, so we're very happy about that. All the systems worked okay, had no real problems there. Apparently, due to a combination of the way the hatch vent occurred, plus perhaps some gyro problems - rate gyro problems of the type that we've had all along in the spacecraft. We did have some concern for a while on that momentum state, right there at the end of the EVA, in trying to turn the telescope back on. But, that has - it's no real problem and we did fire some TACS of about 200 pound seconds. But that's all settling down, now. We've done the - inhibited the momentum dump and done the S183. We finished up very early, as you know, which we kind of expected to do anyway. And since that time, why we have been very pleased in that we sent the crew a fairly extensive shopping list of activities to do, many of which had been planned for tomorrow's Flight Plan. And the last report that we got, just as you perhaps heard over the Vanguard, they are going to do all of those, which is beyond our expectations. And we're very happy with that, because it allows us now, to, we hope, hold tomorrow's Flight Plan to the - basically to the one medical run. The - with the blood samples. And also, to concentrate on doing all the transfer activities. As you're well aware, that's a very complex operation and it's easy to overlook something in the rush. And we'd like to have - for the crew to have plenty of time. And I think they must feel the same way, because they're doing everything they can to get all these other odds and ends out of the way. So, it looks like we're progressing very nicely towards wrapping the mission up. And once again, I think we're very, very pleased with the crew's performance and the equipment performance during the EVA, today. Now, I'll let Rusty describe the actual EVA.

SCHWEICKART Okay. I really don't have too much to say about the EVA, except that it went very well. I think we were out, a total of an hour and 36 minutes, wasn't it?

WINDLER Something like that.

SCHWEICKART Which won me a couple of bets, which when I get thirsty, I'll collect. Aside from that it was essentially as expected. We did three additional jobs that we had not planned preflight on this EVA. Those were to hammer on CBRM 15, to free up the sticky contact. We also cleaned the white-light coronagraph, outermost disc, the D-1 disc, which had a piece of contaminent on it, thereby obscuring part of the data. The third thing was to deploy a piece of the parasol material around one of the trusses, in order to see what its degradation - to have a sample to bring back, really, at the end of Skylab-III of the parasol material for comparison with our tests on the ground here, on that same material. The - In trying to list the things that we learned out of the EVA today aside from scoring some more su esses pleasent ones, it looked to me as though - from the crew comments, it was obvious that the simulations that we've gone through for the past two years in the neutral-bouyancy tank were obviously quite good. They consistently made comments about the - -

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SCHWEICKART - - that we've gone through for the past 2 years in the neutral buoyancy tank were obvously quite good. They consistently made comments about how well the film transfer booms were, and translating along the hand rails was obviously very easy. The foot restraints were again remarked on. So it appears that our preflight simulation for EVAs of this kind are very good. Although, I would say, again from the comments, as Pete said, this big water tank up here in the sky is a lot easier than the one at Huntsville, which confirms things we knew. That if you could do it in the water tank, and you can never always but, most of he time it is easier when you get up there. Of course, that eliminates what I said about the last EVA. And that is when you do have preplanned hand holds and restraint systems in place that the job is a lot of fun, and relatively easy. And it's only when you're going off on things where you don't have adequate provisions that the job gets kind of tough. And today that was again to some extent emphasised by the crew saying that the hardest job they had to do was put out that, that piece of parasol material. Actually it was cut off the sail, SEVA sail, but it we left the capton layer inside so that what they put out was identical with the parasol. And that was the toughe job because it was done on a piece of the - in a location on the deployment assembly truss that was not planned for EVA. And the crew had very little to hold onto except the truss itself, and that's a hard job. The other thing that we learned was that as you might expect, really there is a lot of flotsam and jetsam that gets trapped inside of any piece of gear and the ATM today appeared to be no exception. Pete remarked a couple of times about bits and pieces of things floating around the area. And when we did get the white light coronagraph back on you could see, and I'm sure you all saw bits and pieces floating through the field of view. And Pete guessed that what we were seeing was things coming out of the ATM since he had noticed quite a few when he was out there that obviously had come from inside. And I think that that's all I'd like to say except that it was another very nice day.

PAO Lewis Alexander. Please wait for the mike, to get it on the transcript.

QUERY Rusty, if I recall right, Pete has been talking about things like washers floating around in there, and either nuts or bolts or something like that. Doesn't that sound like to you a faulty inspection. Would you like to go up in a spacecraft and have those little odds and ends floating around?

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SCHWEICKART Well, I've been up in one, and it didn't bother me too much. This is something which is almost unavoidable. It's like someone coming along - the top seargent coming along with his white glove after your wife or you have cleaned the house. You're always going to be able to find some dust laying around on top of the window sills or somewhere. And the zero gravity environment is one which happens to free up these little bits and pieces that do get left behind. There is a great deal of care spent in making sure things are clean, but there are limits to what you can do. And I guess all I can say is nobody is perfect.

QUERY Not to press it too far, but wasn't it something like a piece they left behind that they blamed for part of that Apollo fire. And when you talk about a washer being left behind, I would just raise the further question, couldn't that sort of thing be spotted by an inspection?

SCHWEICKART Well, first of all, I really don't know what the cause of the Apollo fire was, but to go on. You can usually check to see if something is there, and in an inspection typically you inspect to see that the job was done correctly. And I doubt seriously that a washer was left behind. I think what happened is we carried an extra washer into space with us. And that's a considerably more difficult thing to find. Now in the Apollo spacecraft, one which is relatively small in the command module, you can tumble and clean the spacecraft which is done, that is after they get it all done, manufactured or nearly done manufacturing and testing you go through a thing which is called tumbling clean. And the thing has been kept spotless all the way through, but as soon as you start tumbling it in a rig which literally turns it and twists in every direction, it's frightening the sound that comes out of it when that's being done. And a lot of things come out the open hatch.

END OF TAPE

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SCHWEICKART - - turnsit and twists it in every direction. It's frightening - the sound that comes out of it when that's being done. And a lot of things come out the open hatch when they do that. Just - you know, the same thing here as washers and bits and pieces of string and that kind of thing. And it's just impossible in a spacecraft as complex as these to not have some material that gets away in the several years of processing that it goes through. Now in the case of the ATM, or something as large as the workshop there's obviously no way to tumble and clean it. So that you have even less opportunity for shaking loose those little bits and pieces of - of whatever. So there's no way to do a perfect job, but I think that what we do with the inspection is not - is not find these little bits and pieces that are left behind. We - we make sure that the thing is put together correctly the first time, and I think we do a fine job on that.

WINDLER I think we also have a part count too that says they count the things - the tools and things that they take in and count them when they come out, much as a doctor counts the swabs or the tools that he works with to be sure he doesn't leave anything inside of people.

PAO Take that one there first then back to Bruce.

QUERY Pete Conrad noticed as he was looking around that the paint was blistering and peeling off both the command module and the outside of Skylab. Is this going to in any way affect the amount of heat that either one of the vehicles absorb?

SCHWEICKART I don't recall that he said that about the Skylab, by the way. He did comment on that on the service module I believe. And so I don't really think it's going to affect the Skylab itself, and we don't think that's anything unusual for the service module either. We're not expecting - anticipating any problems at all in the reentry.

SCHWEICKART We've seen that before during Apollo - the same thing.

QUERY Milt, would you bring us up to date on the shorted - short in that heater in the CSM? In the - I think it's in the secondary coolant loop or whatever.

WINDER Yeah, we tried to - that's a short to power.

WINDLER As best we understand it it could be a sensor gain but we think probably it's really a short to power. And we tried two different ways of powering down that short and we were unsuccessful at doing that. And it doesn't concern us a great deal except that it means that we have to to change the entry procedures, and we'd plan on flowing through that

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secondery loop all the way up until we had the final CSM's command module-service module separation and of course, using the guillotine cutters as it - they're designed to be used. But we would cut it while the fluid is actually flowing, which we haven't done in the past just because we don't think it's a good idea. But not because the equipment is not supposed to be capable of doing it. So we've just about exhausted the possibilities, I think, of finding out something about that. Are you there?

QUERY Well, what - I'm not really sure I understand then. Will you -what, be working off the what - primary loop then I guess? Is that - or - -

WINDLER (garble)

QUERY - - doesn't affect the loop at all?

WINDLER The thing that we're concerned about is if the - when we stop the flow in the loop, that the heater will come on in a sort of a stangnant condition and have a local boiling you might say, which might burst a line or something like that - a high pressure area. And so we want to avoid that. But there's no - first of all we're not - we're not even sure if the heater will even come on because they're still controlled automatically. Oh, it's possible it won't come on. But anyway, we're just planning for the case when it - if it does and trying to avoid this stagnant condition in the loop by running it, which is no big problem.

QUERY One more on that then. So in other words instead of shutting it down just for SEP, you're going to cut it while it's running. Is that - -

WINDLER We've always run the loop but we usually bypass the radiators, and we would not do that. We'd let them flow and then we'd go ahead and cut it. So the loops have always been powered anyway, as far as the pumps being turned - turning.

FAO Abbey (garble)

QUERY Rusty, when Pete Conrad was hammering on the battery Paul Weitz made the comment that the ATM was whipping around. What was going on there?

SCHWEICKART He was just pulling our collective legs, Abby. That was - I asked Pete how hard he hit it, and that was the Weitz subtle humor.

QUERY Pete said that he felt the umbrella should be rotated a bit. Has a decision been made? Is it going to be twisted?

SCHWEICKART It's been rotated.

QUERY And what was the effect?

SCHWEICKART Of course we don't know yet, it takes a while. Tune in tomorrow.

QUERY Okay.

SCHWEICKERT We'll all be watching - -

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QUERY Is it going to be twisted?

WINDLER It's been rotated.

QUERY And what was the effect?

WINDLER Well, of course, we don't know yet. It takes awhile. Tune in tomorrow (laughter). We'll all be watching that one pretty carefully. We - just in case there was some mistake, why we tried to mark the - the old location so we could go back to it. Not that we don't have confidence in the crew's ability to fix things, but we're just hedging that bet.

PAO Any other questions? Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 19, 1973
4:21 a.m. CDT

Participants:

Don Puddy, Flight Director
Dave Garrett, PAO

SL-II PC-63A-1
Time: 04:21 CDT
6/19/73

PAO Okay, we ready to go?

PUDDY Okay, if we're ready to go. This is a heck of a time for a press conference, isn't it? The crew is up and starting their EVA prep. Of course today, the big item is the EVA. Hatch opening is scheduled at 6:40 local. However, the way the crew is progressing it's possible that that could come somewhat early. I think the earliest it possibly could come is about an hour prior to scheduled time. And it's going to be hard to tell for about the next 35 or 40 minutes as to whether or not we are going to be an hour early or not. First activity, of course is to strike the old CBRM 15 and see if we can jar loose the SAS contactor. From that we're going to go through the normal ATM film retrieval. We're going to dust the S052 white light coronagraph lens, which has a - some sort of contamination particle, we think dust, on it. We're going to place a piece of parasol material on one of the ATM struts. Same type of material that is in the JSC parasol which is now deployed. We have scheduled today approximately three hours for the EVA. However it is very possible that the crew will be able to finish their scheduled activities in somewhat under that time frame. In the event that they do, we have prepared a shopping list of items for them to do. Some of it involved - we're speeding up some of the things that were in tomorrow's very crowded flight plan. And also possibly one additional run of the S183 experiment. Otherwise we just - in today's flight plan - we just have a few cleanup items, starting some of the transfers and some miscellaneous corollary experiments. As far as TV is concerned, which you might be interested in, I have some figures for you here. We are hoping to - we're not having any external TV, as you probably already been briefed, but we do have the Science Pilot doing some handheld TV work. Possible, if he can work it in, it's at his option. But if he does do it, we will be bringing it down real time between 11:02 and 11:19, these are Zulu times I'm giving you; 12:38, 12:54; 14:16 and 14:24; and this over Goldstone, Texas and Mila. They may be doing some VTR recording, of course there would be some delay in that. As far as the subsequent activities are concerned, day 27, which is tomorrow, is the last medical run and it will be conducted on the Pilot. And of course, we start the medical deactivation and stowage and what we call our day 27 transfers. And there is a considerable block of time alloted in the flight plan for that. Day 28, where we begin our deactivation process on the cluster. Friday, of course is the final deactivation and entry, and

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I have a couple of times for you there. We plan on closing the hatch at approximately 01:00 local. Undocking about 30 minutes later, about 01:30 local, and splash at around 08:45 local. The latest coordinates I have on that, and these may be somwhat off, but they're close, is 24 debrees 41 minutes north, and 127 degrees 08 minutes west, which is just off the coast of Baja, California. The crew seems in very good spirits this morning, chipping right along as usual. I think if anything, the one thing that we have seen on the last couple of days is that the crew's learning curve on how to conduct operations has speeded up even more, I think, than they anticipated, and yesterday, in talking it over with some of the guys who were on yesterday, I guess it was all we could do to keep up with them. Everytime we had something ready to go, thought they'd be coming up on that item, they were already ahead of us, so they're really moving out. I'm sure this will have tremendous ramifications when we get into a 56-day mission and another crew's learning curve goes up like this, we'll really be able to accomplish possibly more than originally anticipated as far as some of the activities we hope to. That's about all I've got. Open it up for questions.

PAO Okay. Fine. Do we have any questions?

QUERY Yeah, how about running through the SUS loop and how that's going to work today?

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QUERY How about running through the SUS loop and how that's going to work today?

PUDDY Okay. All three crewmen are going to be on SUS loop number 1. We're not actually using SUS loop 2. The TCV B valve and the secondary coolant loop - we feel like it is - is modulating, but it is doing so intermittently - probably could go ahead and use that loop, but we feel like there is certainly more than adequate cooling with the primary loop and SUS loop 1, and should be no problem operating that way for the EVA. And we have looked into it tonight, as far as any possible problems associated with the position of - present position of that valve. As far as the unmanned time frame is concerned, since it is a little bit colder than we would like for it to be, and had determined that at the 2 psi level that we expect to be at during the unmanned time frame, and its present position that we shouldn't have any problems with condensation or anything of this nature.

QUERY Can you tell me how they're going to wrap this piece of the parasol - or just how that works?

PUDDY Basically, what we're hoping to do there is to - is to just place it on a piece of the ATM structure such that one half of it will be exposed to daylight, and one half of it will be exposed to the sunlight - or excuse me, one half to sunlight and one half to darkness. And from that draw a comparision with any Delta that we can see in the - between the two.

QUERY How're are they fastening that? What's going to hold it there?

PUDDY I'm sure it's the good old gray tape, but I'm not positive.

QUERY And - getting on to Friday. They're supposed to do some kind of a fly-around before they re-enter. What's - just literally circle around the Skylab taking pictures?

PUDDY Yes. All of the specific details as to the exact targets that they're looking for and things of this nature are still being worked. Should have those probably - well, I would imagine by tomorrow night. Most of the targets defined - as to things that they would specifically like for them to take a look at.

QUERY You mentioned they got a real full schedule tomorrow. That's mostly deactivating - -

PUDDY Most of it is associated with the - what we call the day 27 transfers. Just give you a rough hack here. We start out with an EREP malfunction procedure. Here, all we're basically doing is we're going through all of the S190 cameras, making sure that the aperture settings for these particular

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cameras are exactly as we hoped they would be. If - I don't know how familiar you are with the aperture on those particular cameras, but they're - they're a circular device with holes. And you actually rotate the entire circle. It's not like an iris that you're familiar with in a regular camera. And we just want to make sure that the knobs on each one of those cameras, when it says it's at f/2.8 or f/16, that's really the hole we've got there. So, we're going to verify each one of those cameras, because we could, if for some reason they haven't been properly positioned, we can compensate for this on that particular camera's film during the processing. So we're going to verify that, and then go ahead and close out the EREP. Do a final cleaning on the tape recorder and so on and so forth. Then we begin the transfer - the Commander begins the transfer of - of all the equipments that are necessary to be brought back to the CSM. The Science Pilot and the Pilot are involved, as I mentioned a minute ago, in their final medical run. The Science Pilot then more or less goes into the deactivation and preliminary stowage of some of the medical equipment. The Pilot does some corollary work, and then towards the latter part of the day, the Commander and the Pilot get together and start - more or less a walk-through inventory of everything that's stored in the command module, just to make sure that everything that's supposed to be over there is over there. We wouldn't want to go to all this trouble collecting all the scientific data and then leave it up there. So, there is a - it's a full day, and it's a very conscientious day, and it's one where we're beginning the process of - along with this day and the next day, of making sure that we essentially leave Skylab in exactly the form where the next crew can come in there and begin their activities. In other words - -

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PUDDY - - leave Skylab in exactly the form where the next crew can come in there and begin their activities. In other words, this activation that we went through at the beginning of Skylab 1 was actually a major activation for the entire Skylab program. We're even going through such things as, I guess you could call it, maid service, or whatever - going through and changing all the towels and getting everything all squared away, so when the next crew walks in there, they've got a nice clean home to live in.

QUERY When the next crew comes up, they won't take a couple of days to get going then, like it did this crew.

PUDDY No, I don't know the exact length of time that is budgeted for that, but it's certainly not this time, Frank, that we talked about on Skylab 2.

QUERY And when they take an inventory of what they got in the CSM, this is some kind of a checklist they have got with them. This is -

PUDDY We are preparing - In fact, we just went through the next to last iteration of that particular list, we call it the day 27 transfer list, and one more team is going to be taking a look at it. We'll be uplinking that tonight for the crew tomorrow morning, and it's just basically a listing of all those things that we expect to be transfered from the workshop to the command module and where they're supposed to be stowed, that type of thing.

QUERY Is there going to be any stowage problem? There can't be, they just don't have a lot of extra things to bring back, or do they? Parts or things like that that you hadn't expected them to bring back?

PUDDY Awh, we're bringing back an extra water dispenser that we didn't plan on, which is an object smaller than the ashtrays that we have here. There's - there may be an extra carrousel of 183 film and things like that. I think you got a fairly decent feel of the extra material that we - although it's not directly comparable, because now we are - reentry is a little more sensitive to weight and CG than is launch-rendezvous, but we have got room and weight allocation for all the objects that we plan to bring back. And there's been no significant problems, Flagg, that I'm aware of. Everything that we expected to bring back plus a few other small items, we are bringing back.

PAO Any other questions?

QUERY Don, you said something about their learning curve on procedures and getting the things done appears to have gone up. Is there any further explanation to that, or is it just good students or - and you said that this would improve even more on the next mission.

PUDDY Well, let me clarify that. When I said it probably would improve even more on the next mission, I was implying that strictly from a standpoint of duration. I think we've been looking at the present time, 26 days in space, with the crew showing increased adaptability each day. I think we can see the same thing on the ground, by the way. After you look at the Flight Plans and the pads over a period of time, you find that you can start assembling these things where you can rapidly find where you need to go next. You can begin to put things in certain locations, and you can always go back and find them there. Housekeeping is a very important item. And what I was trying to imply on the Skylab 3 is that if the learning curve of the next crew is the same, and I have no reason to believe that it won't be, and you talk an extra 28 days, then they will be through the same curve that this crew has gone through and will be able to essentially take the - take advantage of the key items that this crew has learned. Like, for instance, we thought originally some of these instruments that were fairly large that we had to install in the SAL would take two crewmen. One as a prime and one to assist in their installation. This crew has found out that in a lot of cases they can get by with a single individual doing that particular job. Well, this essentially, in a lot of cases, cuts the time in half or at least by a third. And we will be able on the next mission to allow a few days for the next crew to find out the same thing, and then we'll be able to go ahead in our flight planning to take advantage of that thing. T e other thing is that certainly the second crew is going to have the advantage of the debriefing of this particular crew , and you know how invaluable that is as far as being able to figure out certain items that they found as short cuts and so on and so forth. So yes, I expect the efficiency will go up, primarily from the standpoint they've got an additional 28 days and secondly from the standpoint they've got the advantage of this crew's 28 days experience up there and their learning curve.

QUERY What has the second crew been doing during this time? They watch the TV or what? While the first crew's up there, what have they been doing, say the last week or so? Do you know?

PUDDY Oh, I haven't followed their detailed schedule. We have - There are several items that they have been looking at from the standpoint of what they

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have read in the transcripts from this crew. They have asked several questions which we have forwarded on up to the crew. Things like, on the ergometer, they're interested in the restraint system and looking at how they're going to be working that. This crew, the Skylab 2 crew, went through several runs before they finally perfected what they considered to be the optimum way of riding the ergometer. They now have the options in order of priority that the Skylab 2 crew considers essential, and I'm sure now they're looking at conducting their runs in that fashion. They're going through the standard preparation with a little more emphasis on those items where they feel like they do not have the benefit of the Skylab 2 crew's experience. For instance, there are other experiments that have not been conducted on Skylab 2 that will be conducted on Skylab 3. But it's more or less the general run of the mill preparation that each crew goes through, with emphasis on trying to gather as much information about the Skylab 2 activities, as it may apply to their operations, as they possibility can.

PAO Okay, we'll break if we have no other questions. Evidently the piece of sunshade, the 18-inch piece of sunshade will be attached by velcro, which the crew has sewn strips of velcro to the sunshade, using their pressure suit maintaince kit. This was just passed over to me from Mission Control. Any other questions? If not, good night.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 18, 1973
14:51 p.m. CDT

Participants:

Milt Windler, Flight Director
Robert Parker, Astronaut
Bill Bates, EMU Flight Controller
Scott Millican, EVA Crew Procedures
Milt Reim, PAO

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PAO All right, if you can tear your eyes away from the TV, we'll get started. On my right we have Scott Millican, who will be our EVA man tomorrow. On his right, Milt Windler, Flight Director. And on Milt's right Bill Bates, the EMU hardware man. We'll let Milt start it off.

WINDLER Okay.

PAO One more thing, excuse me. Bob Parker will be joining us in a few minutes.

WINDLER Okay. We had another good quiet day with a lot of experiment activity. No real excitement on the spacecraft, for which we are grateful. Did 2 medical runs, on the Commander and SPT. Of course did the ATM work, did just a little bit of corollary activities, and as you already know, we haven't done any EREP maneuvers in a long time. I think the crew indicated on several - in several ways today that they were ahead of schedule in almost all the activities that we gave them. In one of the medical runs, in particular, they were already through the protocol when they got to a station where we expected to find them still finishing up. So they have been able to just proceed right on through the activities. The ATM was the same way, they were actually able to complete a viewing cycle well ahead of schedule and sent us a TV way early. I don't believe you can - probably can't shut that down. We - we also reviewed some of the activities that they had accomplished yesterday on the corollary experiments, particularly the S019. And it was also obvious there that they were able to do the pad activities within less than the amount of time that was designated. We have discussed with the crew the EVA procedures. As you know, we've already uplinked them to the crew and talked with them about it. And I think we've answered all their questions. They've actually, probably done most of their preparation already, although they may still be doing some and indicated that they might do some later on this evening, if they didn't get it all accomplished before supper time. And we think we're pretty well squared away. I have Bill Bates here that can tell you about the details of any of the hardware that we're going to be using. And Scott is an expert in putting together procedures and has worked with the crew in the water tanks. And Bill has done that to a certain extent also. So if there are any questions concerning the EVA, we'll try to answer them. Oh, let me tell you one thing about the EVA that you may or may not be aware of. We at one time considered taking a TV camera out. It was a sort of a - I guess one of those funny situations. I think

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the crew offered to do it because they thought the ground wanted to do it, and the ground proceeded on the basis that we thought the crew wanted to do it. And it became increasingly obvious that really neither one of us was really keen on the idea. As you know, we've tried that and discarded the idea as being difficult tc do with the long cable that's required on the TV camera. That is, hand carry it. Of course we intended to put that on a - on the - through the scientific airlock. But we had tried that in training or had discussed doing it and decided not to carry it. So it was not going to be easy to rig it up, and it was going to take crew time. And we just decided that when it became so obvious, that the thing to do was to discard the idea. So they probably will give us some pictures similar to the ones that you saw out of the front forward compartment, either STS or command module windows during this EVA. So I wanted to say that to you.

PAO Okay. We'll take the questions now.

QUERY What was the problem on the S093?

WINDLER In the what?

QUERY 92. It seemed Conrad had done something with it he wasn't supposed to. Do you recall that?

WINDLER No, that doesn't ring any bells with me. I don't know, let me think about that a little bit.

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WINDLER - - me. I don't know. Let me think about that a little bit.

PAO Tommy.

QUERY How about somebody just walking us through the EVA from start to finish.

WINDLER Okay. We'll let Scott try that.

MILLICAN Well, first thing we're going to do is of course, after EGRESS, we're going - the EV-1 - By the way there has been a change in the EVA crewmen for this EVA. As planned, - We originally planned for Pete Conrad to be the EV-1, the crewman, who remains in the FAS, and EV-2 was supposed to be Joe Kerwin, who would go out to the ATM and retrieve the film. However, we've already had one EVA on this mission, whereby, Joe and Pete have been EVA. So I think Pete decided that he thought it would be good to let Paul do some of the EVA, and he has been trained on it. So they have switched roles. Therefore, Joe Kerwin will remain inside, and play the role of EV-3. We will EGRESS, and one of the first things we will do, is attempt to recover our CBM 15 - CBRM 15 shortly after EGRESS. Techniques are simply to use a hammer that's on board that we've rigged up a tether for, tether attach point. And the crewmen will attempt to hammer on the CBRM, bring a little life back into it. A number of procedures that the crewman inside has to do in coordination with that technique. We will retrieve the S054, S056, S082-A and B. Our S082-A, as you recall, was load 1, which was launched in the ATM, had malfunctioned and was changed out on the day-14 EVA. Load 2 is presently in there and will be retrieved and brought back in and returned. Both load 1 and Load 2 will be returned in the command module. At just prior to retrieving the S082-A and B, however, we will attempt to clean part of the optics on the S052. There's a contaminant involved. The crew will use a little lens brush. It's a brush about the size of this pen, has some camel-hair bristles. He will simply take the brush and try to wipe the debris away. We have spent a good bit of this week working out these procedures on the CBRM-15, S082 cleaning. And one more little DELTA to our normal EVA procedure, will be to deploy a portion of the JSC sail material. This sail material is the same as that used in the parasol that is - is out at the moment, that is deployed. This will be wrapped around a strut and then velcroed simply to the strut. We will retrieve the D024, and the two EVA crewmen will ingress. The EVA's expected to last somewhere - 22 and 3 hours.

QUERY I have a couple of questions. Number 1; About how big is that piece of material going to be that you're going to wrap around the strut?

MILLICAN 18 by 18 inches.

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QUERY 18 by 18 inches. And where is that strut?

MILLICAN Bill do you want to - -

BATES Yeah. The strut that they're now proposing to put it on is the - I'm not familiar with all the technical terms, but - -

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QUERY And where is that strut?

WINDLER Bill, you want to.

BATES Yeah. The strut that they're now proposing to put it on is the -I'm not familiar with all the technical terms of it, but if you're familiar where the D024 samples are located. It's one of the two struts that forms a V, just above and to the plus-Y side of where the D024 is. So, it's just down the plus-X axis from the EVA bay. So it's well within the normal EVA area.

QUERY I've got a couple. I think I understand - Why, specifically, are you putting in on there? Explain once more, please.

BATES Well, the original intent of it was to take - compare some photography between this sample, which has not been exposed to solar, and the parasol. It takes some close reference photography for the - to try to determine color degradation. But they determined that with the cameras and the equipment and everything we've got on board, that - I don't know if I've got the total technical facts on this, but that was determined that it would not be that feasible. They were talking about taking the photographs from like 300 foot from a fly around and they just determined that you wouldn't be able to tell that much difference between it. So the intent now is just to use a sample of it that will be easily retrievable for the first EVA on SL-III, to get a good data point on the degredation of the material. And it will be deployed with the nylon fabric out, the orange side out, just like the parasol. I think another point there is that - maybe I missed what you were saying there, but that'll also give us a comparison of sunlight and shadow. Did you mention that?

QUERY No, not really.

BATES The material then, you know, under different solar conditions, you might say.

PAO Fred.

QUERY So I get this straight, does this tell you how much the parasol has deteriorated, if any? Is that the point of this?

BATES I guess really it's not going to tell us anything from this EVA. But from the first EVA on SL-III, it will give you an additional degradation data point on the material in the environment that we're looking at. You know, there are several facilities testing it here on the ground, but this will give you a good base line data point as to how accurate their testing has been on it. I believe that's the intent of it at this point. You understand, of course, that the - obviously the environment on

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the ground is not the same as in the spacecraft, so it's - the secret to all that kind of testing is have tests that represent the true - as close as you can, the true environment, and that's - we're trying to get a handle on how close our tests match. It's also the reason for asking so many questions about - from time to time, about the color of the material that's the parasol that's being used now.

QUERY Wasn't real clear. Pete made some little comment like,"Yeah, and he really looked good flying it too, considering it was only tethered 2-1/2 feet".

WINDLER Oh, that was the 509.

QUERY 509. Was Weitz really in it, or was Pete just kidding?

WINDLER No, he was just kidding.

QUERY You're sure of that?

WINDLER Yes. It was tied down. No, I'm not absolutely positive, becuase I wasn't there.

QUERY So he really could have done it?

WINDLER Pardon?

WINDLER I'm telling you that they didn't fly it. Now you can - that's the best I can tell you. I'm sorry - I wasn't relating - the 2 foot tether triggered me there; that's the cue I needed.

QUERY Are there any plans to get a piece of the parasol that's out now and eventually bring it back?

WINDLER Well, we don't plan to do it on this EVA. And it's still under discussion what - exactly what to do for the third EVA. I mean Skylab III EVA. And right now we're thinking that the thing to do is put out the MSC sail; that's the primary plan right now. I mean - I'm sorry, the Marshall sail, MSFC Sail, to the twin boom.

BATES I might point out that the problem with doing that is the same problem we ran into with the SAS being deployed. It's that there are no easy handholes to get down to the area. So we - if we did that, we'd have to again reconstruct something to allow the crewmen to move down to that area.

WINDLER That's the parasol you're talking about?

BATES Right. I might mention, if somebody knows They asked me before, "How heavy is that hammer we're going to use - is the electrical restoration tool?" Do you know?

BATES It's about - about 12 inches long, and I don't know exact weight, but - -

WINDLER I'd guess in the neightborhood of like 16 ounces - -

END OF TAPE

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WINDLER - restoration to - Do you know? It's about 12 inches long, and I don't know exactly, the exact weight but -

SPEAKER I'd guess about 16 ounces -

WINDLER - yeah, it's about 16 ounces, it appears to be an all-metal handle and head, and it's a small balpeen hammer is what it amounts to.

SPEAKER (garble)

SPEAKER - (garble) I believe. I know it's part of the - it was in the MDA (garble).

WINDLER No, it's in the OWS, but it's just in a general tool kit. They've got a pack of tools in there, and you don't have a tool kit without having a hammer in it.

QUERY How large is that CBRM area, and I presume that's just kind of a light tapping or what?

WINDLER It starts off light and we've - in fact I told you yesterday, of course I don't think you were here, but they have tested this equipment at Marshall with - hitting it with a large hammer, and they described it as a sledge hammer, I don't know literally what that means, but they have also instrumented the equipment to see if it affects the other relays around it, so we are actually, have approved - or the plan that has been given to the crew is to hit it - and I don't know how hard they'll hit it at first. If it was me, I don't know if I'd hit it too hard at first, and then try the contacts to see if they'd been freed. And then hit it harder up until some ultimate point. No, we don't think they can crack it at all, because it's hard to get that much force. It is just - you know compared - as hammers go it's not a big hammer. Maybe after we get through, we can point it out to you on this model, but - there are 6 CBRMs in a fairly large area there, and this would be one of those. Of course, it's a particular bolt or Allen nut or screw that we've instructed them to hit, that we know it's right there where the relay is - the suspicious relay.

QUERY What are the plans for the next crew to do for their EVA, tenative plans that they're going to do with the parasol?

WINDLER Well, our primary plan right now, is to use the Marshall twin-boom sail - to deploy that over the top of the existing parasol. Then there's also some film replenishment involved. You're probably aware of that.

SPEAKER And the S149, I think, is still being talked.

SPEAKER Okay.

QUERY Whose suggestion was it to change the EV numbers 1, 2, and 3, and have Conrad go out and Weitz stay in?

WINDLER That came from the spacecraft after the first EVA. I think Pete was the one that called that down. He's the commander, it would be his (garble) to make that suggestion.

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QUERY What was the exchange now, who is going to go out and get the film and bring it back?

SPEAKER That's what Scott addressed earlier.

SPEAKER Pete Conrad will retrieve the film.

WINDLER Something that you may have missed there, that we discussed yesterday, and that Scott mentioned earlier, I'd like to point out to you, that they have trained in the tank at Marshall to - cross-trained, so Conrad is trained to do this and so was Weitz trained to do this film removal.

PAO Bob Parker is on the way over, and we had one query here that came in by phone. I guess this is for you Scott. Can you put times on these EVA steps, that's times from hatch opening?

MILLICAN I can try here, just based on our pre-mission flight planning. It'll be just a ball park figure. We'll start here, T equals zero, time equals zero - hatch opening. Okay. And then we'll - CBRM 15 is about T plus 20. Remove the S054 at about - -

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MILLICAN -- remove the S054 at about - Well we'll have to throw in about 15 minutes for that CBRM 15 here, so I'll say that S054 is about T plus 40. S056 at about T plus 50, H-Alpha 1 at about T plus 1 - be 1 plus 10. Okay, then we go to the Sun - Sun end workstation, and ah - let's see - At about 1 plus 30, a pretty big jump in there. Roughly 1 plus 30 will do the S052 - cleaning that is, the S052 cleaning. Then we'll retrieve S082-A and B, oh, at about 2 plus 0, 0. Deploy the JSC sample - sail sample at 2 plus 20, retrieve the D024 at about 2 plus 40, do our final close outs - INGRESS, the airlock module and repress about 2:45, between 2:45 and 3 hours. Did you give them, Milt, the time for the hatch opening?

WINDLER I believe that's 6:40 central.

PAO Yes. 6:40 a.m. central. Bruce.

QUERY Scott, you might have been just overlooking it, but you didn't mention the retrieval of S052, between 56 and H-Alpha 1. You probably just left it out.

MILLICAN Okay. Yes, I did. You're right. S052 comes after S056.

WINDLER Might mention something, here. You recall on the other EVA that we were kind of keyed to going out at a sunset time because of some of the factors involved there about the work stations, or the place that they would be working, not being lit. However, in the case of this EVA, we think that there will be adequate lighting for everything that they want to do, because it's planned essentially. And there wouldn't be any real restriction on when they might go out. In fact, I don't know any reason why they couldn't go any earlier if they wanted to. We would not be constrained, In fact, there'll be very little daylight involved. I mean - I'm sorry there'll be very little night involved, because we are at such high BETA angles.

QUERY If they do free the relay in the battery charges, how many more watts will that supply the ship?

WINDLER That's about 240.

SPEAKER See you.

WINDLER We were going to answer - Before we get into the science world, I thought we would try to show you on this model, if you - Did you have another question, though?

QUERY Where will that be when they get out at sunset? Where will they be? How high is that BETA angle, how much sunlight are they getting now?

WINDLER Oh, - You're right, it's right here on the Flight --

SPEAKER 62.5.

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WINDLER Very good, I was getting ready to guess- -

QUERY 62.5 percent?

WINDLER No, degrees. This is the angle - -

QUERY How much sunlight is that over full orbit?

WINDLER I think we're in the order of about 20 minutes, or something like that now. We're out of the - -

SPEAKER We have about 20 minutes of night.

WINDLER Yeah, - Of night time, yeah. So it's in it's - -

QUERY The question is; Where are they going to be when they get out?

WINDLER Well, if they get it on schedule, they should be close to the United States, somewhere over Texas, or maybe Bermuda, along that area. Maybe just crossing the United States.

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WINDLER - somewhere over Texas or maybe Bermuda a long in that area, just - maybe just crossing the United States.

QUERY Did I here you say there was a good chance that they would begin earlier than 6:40?

WINDLER I didn't say there was a good chance, I said there wasn't any constraint. I was trying to point out to you that before we didn't want them to get out too soon because of the relation, they had to do some activities in the daytime. We didn't want them to get out and get caught by the nightfall. And I'm saying that that doesn't exist in this EVA that we're talking about. And it would not surprise me any if they did get out early, as a matter of fact. In fact we're going to come into work an hour early - an hour before we think they're going to start EVA prep and I'll be very surprised if we don't find that within that first hour, supposedly when they're still eating, that they don't give us indications that they're already doing the prep work. They did this the first time, or the second, you know, the last EVA.

QUERY How much earlier than 6:40 could they go?

WINDLER How early would you like to guess?

HS/SPEAKERS (garble)

WINDLER He doesn't like to admit that very early at all.

BATES No, I've been working EVA preps and all since Apollo 1, I think, and it's not many times we've gotten out too early before our planned time. I guess I could say that we're doing about 2 hours of our EVA prep tonight. See they're configuring their suits and their life support equipment, prepping the ATM equipment, canisters that are going to go outside, they're doing all the work that they can do the night before, short of jumping in their suit, so that in the morning, when they wake up, the Pilot will have to do just a few vehicle systems configurations to support the EVA and then shortly thereafter all three crewmen will get into their suits and if everything -the checkouts go very smoothly, they could get all that work done probably in an hour and a half. And we have about 2 plus 20 scheduled. However, our EVA on day 14, we experienced a few difficulties with some of the systems and it caused us to be about on time, we had a little pad in there and we egressed about on time, although we had some systems difficulties.

PAO Wait just a minute till you get a mike.

WINDLER I don't think this will take but just a moment, but as you can see these I think are intended to

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represent the CBRM packages, here just above the CMGs and they'll be working in this general area anyway, so they'll be able to come around here and tap on these areas, and we - somebody asked me yesterday about the handholds and we think there's many struts around here for them to hold on to. So that would just be, you know, they won't have any long distance to transverse as they did on the - getting around to where the wings were.

WINDLER Oh, you're talking a' ut the sail material. Yeah, if you know - I'm not sure which leg they're talking about strapping into that chair myself.

BATES You can see the D024 sample package, which is the small block right here and the sample is now intended to go around, let's see I've been looking at it upside down, it will go around I believe this rail. Let me, I've been use to looking at on the trainer, and in the trainer that part of it is upside down. But I believe, I believe that is correct. Do you recall, Scotty, being in on this one? I know it's one we did not have handrails on.

QUERY What makes you think tapping with the hammer will do anything?

WINDLER Well, we don't know it's a problem, but from the characteristics of it - -

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QUERY - - problem with that particular valve?

WINDLER Well, we don't know it's a problem, but from the characteristics of it, it's a different situation than we have on the other one. And we think that that's the case here. The way it hung up indicates that it's a relay.

QUERY Can you describe what's wrong with that relay? You know and - -

WINDLER No, I guess I can't anymore. I discussed this many days ago, I guess now, and I get confused, I guess, as the way the logic in there works. I really couldn't explain it to you adequately, I'm sure.

QUERY I guess this is the same question. I don't quite understand. What does tapping with the hammer do with it? I mean what happens, what's suppose to - -

SPEAKER Have you ever had a voltage regulator in your car hang up? Well, it's a little box on the inside of your firewall that - a little box about this big - at least in some cars it's on the firewall about this high, and it controls the way the battery charges and discharges. And if it gets hung up, your battery runs down. Or other bad things happen. I have had occasion to bang on them. I've also replaced them (laughter). Well there's contacts - pardon?

QUERY I don't understand exactly what happens when you hit it with that hammer. Does it jar the - -

SPEAKER Well, the relays are controlled by various relatively small voltages that make switches in there. And these control the electrical path for larger amounts of current. So it takes a relatively small amount of force sometimes to open this relay. Like sometimes they even can kind of stick together lightly with sort of a real small weld, you might say.

PAO All right. We have Dr. Robert Parker here, who will give us a brief run down on the experiment status.

PARKER Okay. What I want - what I want to give here is a status of the experiments essentially to the end of the mission. Today was day 25, and as far as all but two or three of the experiments are concerned, it's the end of the mission. And so the status I'm giving today is, to all intents and purposes, in fact. And those cases where it wasn't, extrapolated that little extra bit. The - In straight hold - cold statistics, as gross as they are, we can say the following things about the - well, if you like, the hours that we've spent on the projects compared to the hours we intended to spend. Obviously, the quality of the observations is something that in all but a couple of cases we won't know anything about until we bring the film, where most of the data is, back home. On manned solar observations, this is time that was

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spent at the control panel of the ATM and time when the Sun was above the 400-K limit, which is essentially when we start taking data. We spent approximately 81 percent of the time we had intended. We got 81 hours, as opposed to a preflight total planned of a hundred hours. So 81 percent achievement, if you want to rate these percentage achievements, which is not quite kosher, but it's probably good enough. Earth resources, we've spent some 88 percent of the time we intended to spend. Now because the Earth resources, if you remember back to 2 weeks ago, when we had this power problem - because the Earth resources data tracks were restricted in length, because of the power problem, the initial four or five EREP data takes were shortened by about a factor of 50 percent over what they should have been. And as a result, we've - all - we've used 88 percent of the time we had intended in terms of man hours. We've only gotten about 60 percent of the data that we had intended. That can be largely attributed to the fact that we had shortened data takes during the first few passes because of the power situation. Earth resources, by the way, I might just note - It turns out to be the one experiment discipline that suffered the most from the power. And it was just because of that particular instance. The medical people have gotten approximately 90 percent of the time that we intended to spend on their experiments. The corollary people have gotten approximately a hundred percent of their time, and the two student experiment - excuse me, there were four student experiments. They've gotten in excess of 80 percent - perhaps as high as 90 or 95 percent. The bookkeeping is a little vague right there. So all told, if we look at the total precentage time spent there, we've done exceedingly well. In fact, I might say that had this been a normal mission, which Skylab did not start out to be - But had this been a normal mission, I would have been quite happy, and I think everyone would have been quite happy with these results. As it is, considering the mission we had and what we've accomplished as well as these experiments, I think we're - Ecstatic is probably too strong a word, but we're exceedingly happy.

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SPEAKER - and what we've accomplished as well as these experiments, I think we're, you know, ecstatic is probably too strong a word, but we're exceedingly happy. I point out that, in particular along with the difficulties of having to put up with reduced power, we did loose essentially 2 whole days out of the mission, which was spent one, repairing the thermal problem at the very beginning, and another one was spent repairing the wing in the middle of the mission. And this amounts to some - close to 10 percent of the experiment time we had intended to spend, since the experiment mission was essentially 22 or 23 days long. So you essentially cut out 10 percent of the experiment mission because of the repairs, and you can score that against the results we had there. I think, other than that, besides the cold statistics, we can highlight a few things here. On the ATM, besides the 81 hours or 80 percent achievement there on the total number of hours of observations, we can point with great pride is - you people who were probably also at the press conference about a week ago, where on day 22, the PIs were, you know, and ecstatic there, I think is not too strong a word, were estatic over the flare which we got and observed. We got the rise time, which is something that we were all very anxious to see whether we could catch, and a few other things. And ATM observations, particularly with the flare, and the increased activities the Sun has seen in the last week or week and a half of the mission, has gone quite well. Earth resources, I guess the best update that I can give you there is not with the improvement of the power situation, and the lengthening of the passes, we have finished up with 11 of a planned 14 passes, all of them over the United States. Exceedingly uniform coverage across the United States, except for the extreme northeast, and we've got, I would say, as good an Earth resources experiment results, or as good a data take opportunities and performance as we could have expected, or better, in fact. But again, like every thing else, we have no idea how well the film or how well the tape, or how well the sensors are going to perform, until we bring the results home. Medical status went off just about exactly as planned. The only particular changes in the medical status that are probably worth noting, are the fact that we did the M131 runs, which are the human vestibular function, the ones where we rotate the crewmen to see how he's performing, and also to investigate, well, among other things, how their sense of direction, with their eyes closed has changed in zero g. These runs we reduced, partly to save time, and we also eliminated the runs towards the middle of the mission on the commander, again to save time. That, in particular, the medical people felt that it was a lower

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priority than the lower body negative pressure and exercise response ones, and to save some time they contributed their part by reducing those particular runs. The corollary experiments, as I'm sure you're aware, are a very mixed bag of a great number of things, and it's hard to talk about every single one of them, and what each one of them has accomplished. But I can say that we have accomplished essentially better than 90 percent, not just of the time spent, but essentially better than 90 percent of the objectives. Now again, that's before seeing the data, but essentially 90 percent of the objectives are better on every corollary experiment, except perhaps for one or two. And I don't think that this - at the present time, that there's any other way of describing the activities of the corollary experiments, without getting into a gread deal of detail, and some of that will have to wait, obviously, until the film and so forth is brought back. And that in short sums up the results for all the experiment areas for the mission and as I say, I think reviewing that, you probably feel as I do, it's been, particularly considering the way the mission started out, an exceedingly successful mission from the experiment point of view.

QUERY What have you missed on EREP? You missed Japan, and did you miss western Europe, too?

SPEAKER We did not get any passes outs - well- apart from a few passes that did extend into South America. And that's partially the way descending passes over the U.S. do. Apart from those, we did not get any passes outside of the continental United States. So we did not get any African, European, or Asian passes.

(Garble)

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SPEAKER - - NOt get any passes outside of the continental United States, so we did not get any African, European, or Asian passes.

QUERY Any Australia - -

SPEAKER Those I don't believe actually were specifically planned for Skylab II. They are options.

QUERY They told us over at the Cape that Japan and Africa were certainly planned.

SPEAKER Well, they are options. I might point out - a couple of other things. One, to get those passes, we have to wake up the crew early or put them to bed at quite late. Particularly, Japan means that the crew has to go to bed two or three hours late just because we have sunlight constraints, you know, the Sun has to be shining on the ground to take the pictures of it. The European passes, it turns out, are best taken when the orbit comes up over the United States, you know, so it's coming up say, more or less, parallel to the eastern seaboard. This means that that orbit then continues over, arcs across, you know, through Newfoundland and the great circle and all essentially and comes back down over Europe. Well, because of the late launch of Skylab II, all the passes we had over the United States were descending passes; we didn't have any ascending passes over the United States. This essentially also ruled out Europe.

SPEAKER I think we said all along, too, that Skylab III was always going to be better for those areas.

QUERY (garbled) the fellows over at the Cape - they planned three.

QUERY What was it they were doing over Africa? Just the other day, you know, they were told to look out the window at Africa, the State Department told them to do that.

SPEAKER The only thing I know about it was they looked at a tanker at Chile. I don't recall any looking out the window at Africa, but - That must have happened while I was not (garbled)

SPEAKER That must have been a real time input.

QUERY Don't they have a good deal of cloud cover during various passes?

SPEAKER Well, I have to beg off on that because I worked the other shift, the shift that plans, and I never get to see what happens. But I do know that all except for a couple of them were extraordinarily clear. There may have been a couple. There was one, of course, the day we had the heavy rains in Houston and - but they were just because it was cloudy in Houston and they got clouds here, doesn't mean that it wasn't clear up to the north. And I know in the track that day that we had predicted clouds in Houston and there were still a tremendous number of opportunitues in Oklahome and

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Colorado and up in that area. And, in fact, one of the targets that day was what we call preincipient - which I don't - it's a double pre there - a preincipient storm conditions and they were indeed I think, a little bit more than preincipient storms by the time that we got them - although they got them very early in the morning. I - the EREP people are always plagued and have to worry about weather before they plan their passes. It's a very big part of their planning. And they'd never cancelled on Skylab II, although that option exists for them, they never cancelled because of weather, on Skylab II. There may have been parts of the track - almost certainly were - parts of the tracks that were covered by clouds from time to time, but, of course, they don't need to get every single square mile along the track. I'm not - I'm a little surprised at the strength of your statement, that they were plagued and lost a lot of time from clouds.

WINDLER I think there were clouds, but you pointed out very well that there are a lot of objectives that require clouds.

SPEAKER Yes. They also - we also got Hurricane Ava which I think was a rather nice little adendum.

QUERY I know on one pass they had - maybe 5 percent of the entire pass they were able to see the ground because it was. It was one of the day during the storm and it was exceedingly heavy cloud cover. At what point does cloud cover knock out EREP over an area?

SPEAKER Well there's two things - there's two ways of doing that. One is if indeed you can't see the ground except for 5 percent of the time, I'd suspect that that wasn't a very good EREP pass and they either - the weather forecasters did their usual trick. However, I'm not - without seeing the statistics, I really don't know and when the crew says, "Hey, you can't see very much of the ground," that's hard to really quantify. But there are - the other side of the coin is that there are a number of - number of EREP targets or, you know, requirements that include clouds, one of which is the formation of thunder storms and thunder clouds in the mid-continental United States. Another one is the one we took care of with the hurricane. However, as far as a particular day when they only saw the ground 5 percent of the time, I don't know.

SPEAKER I think another characteristics of it is -

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SPEAKER That - yes. You were talking about looking through the 191. The 191 is a very small field of view.

QUERY Well, it was their comments that went along with it.

SPEAKER Okay -

QUERY They said that they just couldn't see anything.

SPEAKER Okay, but that's out the 191. The 191 has a very small field of view. This is nothing whatsoever about what the larger picture was for the sides, which the other instruments see.

SPEAKER I think it's true too - -

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SPEAKER - very small field of view - this is nothing whatsoever about what the larger picture was to the sides - which the other instruments see.

WINDLER I think it's true too - on that particular day, if I recall it right that - didn't it - the one that went over the Amazon Basin where it was unusually clear that day. But I was going to make the point that the EREP sites are - tend to be grouped, anyway, in places like California and around Arizona and Houston and around - area we didn't get to - the - well we did too, the Chesapeake Bay area. So, it's - you know and you can fly over - if 5 percent happens to be over the - the Los Angeles area you've really - I think that we probably - in one time we talked about having a minimum of 10 sites per pass to make it worthwhile - in the ones that I looked at the results of, the numbers were up in the twenties in all cases - the post-past evaluations. So, I think - and I didn't look at the total number, but it was a good - well you just mentioned percentages.

PAO All right. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 18, 1973
3:59 a.m. CDT

PARTICIPANTS:

Neil Hutchinson, Flight Director
Dan Green, Public Affairs Officer

SL-II PC-61A/1
Time: 03:59 CDT, 25:08:59 GMT
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PAO Okay, we're ready to start this early morning Change-of-shift briefing with Neil Hutchinson. Go ahead, Neil.

PAO Tell us all.

HUTCHINSON Good night. A very quiet night. They seemed to be getting more and more quiet as you might expect. The purpose of the shift that I've been running here for the past 8 days is to build summary flight plans and the summary flight plans as we've been homing in on the end of the mission are getting more and more straightforward and easier to build, and not so many options. The one we built last night was for EVA, which makes it awfully easy because the EVA time is fairly well blocked out and there's really not a lot of experimenting being done on that day. We didn't have any problem at all coming up with a summary flight plan - I'll give you a little data on the EVA. As best we can figure now, hatch open is 11:40 Zulu on Wednesday. The EVA will probably last between 2-1/2 and 3 hours. The only open items that I know of in connection with the EVA are: we haven't got the information onboard yet on the possibility of putting out - or the procedure to put a patch of the sail out for color comparison purposes. That's the MSC sail that was not used, which is made out of the same material as the sail that is up. And the only other thing is, depending upon how the troubleshooting goes today on the condensate system. We are going to do a little malfunction precedure on the condensate system during the day today and we'll need to use the results of that to figure out how we're going to handle it during the EVA so we can maintain a proper Delta Ps and get the water collection out of the system. Other than that, today is very straightforward.

QUERY When is the EVA?

HUTCHINSON Oh, it's Wednesday. Tuesday - I'm sorry. Tuesday. Excuse me - I had the wrong day.

QUERY No, I'm sorry - It is Tuesday (garble)?

HUTCHINSON Yes, and just saw these flight plans - says Wednesday, June 19th, so someone can't make the day right.

PAO The date's right, but the day is wrong.

HUTCHINSON Certainly. The flight plan is mission day 26 - tomorrow. We're about to close out all activities on the EREP. We've got scheduled in the flight plan for active EVA - we've got the last two big bullets of EREP work, which are mostly some picture-taking of some of the EREP equipment and the final straightening out of the film situation, and cleaning the recorders, and so on and so forth. Gosh, that's it. It's a very quiet night. We're homing in on the end of the mission here. It's about all I can say. This is the next to the last flight plan we'll build, by the way. We'll build

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one more flight plan for day 127. I won't build it, but - cause I'm getting ready to flop over to days now, but we have one more flight plan to build for day 127, and then we move into to deactivation and entry which is all pre-planned - no flight plans.

QUERY Okay. How about the trim burn? How does it look as far as achieving desired result?

HUTCHINSON I think it'll be awhile until we home in on the tracking - I imagine it'll take them 3 or 4 days looking at the orbit to make sure that - that we got exactly what we wanted out of it. All early indications are it was exactly right. We got the proper amount of Delta-V and proper direction and it looks like we'll have a completly nominal ground track for Skylab 3.

QUERY Okay, I guess one of the other things I'm curious about is the unattended operation of the ATM during the period from tomorrow after the EVA until the next crew gets up there. How is that going to work? What can they do on the ground and so forth?

HUTCHINSON Well, as you know, I'd have to go back and look at specific instruments, but as you know we run the 'TM unattended now when the crew is not up there, during the night. And we basically are running an operation very similar to that. We'll be running 54, 55 - I can't give you the list of instruments Art - I really should - somebody could give you a nice concise package, but we'll - we basically committed to running the ATM between Skylab 2 and Skylab 3 about between 12 and 16 hours a day, 7 days a week - from the ground. And we'll be shooting up film, of course, and several of those instruments. And there will be an EVA right at the beginning of Skylab 3 to pick out the stuff the ground used up - -

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HUTCHINSON And there will be an EVA right at the beginning of Skylab III to take out the stuff the ground used up, and get back into shape for a crew manned operations. But, we'll start the unattended full blast after the EVA that night and we will - we'll knock it off on the final deactivation entry day just because there's so much activity in the Control Center that we don't want to get involved in any anomalies or anything with the ATM in case something were to not go right on the unattended. And then we'll pick it up from there and run roughly 16 hours a day.

QUERY How about going through the EVA a little bit as far as what things get done first like- - Like you do the ATM stuff before you kick the batteries?

SPEAKER Yes, the ATM - I haven't got a nominal EVA plan in front of me, but all the ATM film retrievable will be done per standard procedure in the published checklist just like nominal before we do any of the other stuff. The two things that are on the flight plan now for sure on the EVA and the third one - I'm - they are going - I believe the decision was made yesterday afternoon. However, we are awaiting some final word on this little sail color comparison package they are putting together. We are also going to kick the CBRM as it were, hammer it very vigorously. And all the (garble) procedures and plans for that are on board. We are also going to clean the occulting disk on S052. And the procedures for that are on board.

QUERY What - cleaning the occulting disk, what has been the problem with that?

HUTCHINSON There appears to be, as you've seen in some of that white light down-linked television, a consistent very very small bright spot - gosh, I'm trying to remember where it is. I believe it's at 4:00, but I'm not sure, where there appears to be actually an anomaly or discontinuity in the thing that blocks out the actual center of the Sun. It turns out that there is a small contaminant and I've heard the size, it's visible size, apparently on the edge of the occulting disk, and they are going to take a lens brush in there and just sort of sweep it away.

QUERY Would you call it a speck of dust.

HUTCHINSON Yes, I would. That would be the kind of size, probably big enough to - you know it's like that big enough to see.

QUERY I have forgotten or I'm not sure about what the TV is going to be exactly on the EVA.

HUTCHINSON Well as - -

QUERY How much is there going to be?

SKYLAB NEWS CENTER
Houston, Texas

Solar Flare Activity (Freeze Frames)
Johnson Space Center
June 15, 1973
13:30 pm CDT

Participants:

Dr. Guissippe Vaiana, American Science and Engineering
Curtis Hunt, PAO

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PAO (Garble) if they call us. See if they're going to show the TV (garble). Too many people in this room.

VAIANA Do you want me to start?

PAO Dr. Vaiana, we're on the air now. You can go ahead and explain what's being shown there.

VAIANA What you are seeing there is the great event of the day. Is that the H-alpha frames are showing the flare in progress. You see the basically double structure through the active region. Portion of it outlines the magnetic field of one polarity on one side and the other polarity on the other side. And the running through it, through the center, you may feel through that channel a - what corresponds to what we call a neutral line. And the brightenings that you see, which are considerable brightness with respect to the active region normal brightenings, are seen on both sides of the neutral line. If that flare had been a larger flare, you probably would have seen this thing as what is called normally a classic of two ribbon flares, with the brightening separating out, one from the other, right and left. The position in which you see the cross area is the position where perhaps some of the XUV and X-ray photography show the brightest portion of the flare in progress. Question somewhere?

QUERY We can only see the flare on one plane here. How far up, away from the surface, does it come?

VAIANA Yes. The magnetic field extends into the corona, and of course XUV and X-ray instruments are looking throughout the transition region above the plane and then throughout the corona. A vertical extent is little to determine, but you can see where it is going up of the order of perhaps 100,000 kilometers above the solar surface, which will be of the same order of magnitude, the same size, as the active region itself. And one of the crucial questions to be answered in a flare observation such as this, which is the first time we have had an opportunity to have it, is - Is the flare triggered during the very first few minutes, just before it peaks, just while it's rising? Is the flare triggering occurring at one specific point? Is it occurring at several points? What is the configuration of the magnetic fields where the flare triggers? And that should give us a hint on what the mechanics for triggering it is. No, but it's very difficult to do this sort of observation from a rocket. This is the XUV photograph. As you can see - let me get oriented out here - the region where the flare occurred is that region out here. I should describe this north and centered a little bit of east of the region - I'm sorry, it is this one out here, where the flare is. That's the region that the astronauts pointed out to be 10 times brighter than the rest of the surrounding XUV

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monitor brightness. The active region, which is the most active present on the disc, is actual active region 37, which is, in the monitor that you are seeing, is right from the center. That was the only active region which had any flare probability of this class. In reality, although the probability for the active region 31 was very low today, very close to zero, we had naturally that great event. I want to point out that any event that corresponds to that particular one is an M5. Corresponds to 5 times ten to the minus 2. If you go, you have to go at least one order of magnitude higher than that to really get the very huge big flare which has all the characteristics of the great flares, so to speak. But that has been the largest we have seen so far from Skylab. In fact, it's the first one that we have seen to the rising portion and the (garble) as well. The XUV, if you'd - -

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VAIANA In fact, this is the first one that we have seen the rising portion and under the (garble), as well. The - If you don't have any questions I'll proceed. The XUV monitor will show you the (garble) region is for the old region that goes from 10,000 degrees to - or a little above that out the the middle of the great corona. So we'll integrate the light from around that region. And therefore, what you're looking at is the contribution brought from the transition region (garble) from the corona in the XUV monitor.

QUERY Have you gotten any observations from the ground on this flare?

VAIANA Of course, it's a little bit too early, because everyone has been busy on ascertaining the effect of that flare on our film budget, for instance, for people who have the - who want films to see whether we've really got observation to make sure that the computer programs are running properly, to make sure we can retrieve all of the data appropriate for that, and to see how we have to change the observing program for the coming day. There's a planning session going on right now, in which I'm sure that question is being discussed in detail. There's a second frame and you can see the, not an XUV frame. You can see the - crosshairs, or rather the circle which outlines the pointing position of the astronaut as being more centered towards active region 31. So while the first frame was representing the ah - a (garble) sort of condition they represent when some one is pointing to that region. Going back to your question, we have later confirmation of that flare has been observed from the ground. NOA has told us that the - one of the observers of classification, is what is called 1-bead, for response to the size of the order of 10 to the 9 square miles. And B stands for bright, which classifies it in the H-ALPHA observation. It's a little bit too early to say what's - what the ground observations will be for that flare. However, expectations are quite great because it occurred over a United States pass, and we all know that many of the observers that we're cooperating with were trying to observe today. I'm sure that peaks (garble), the high altitude observer (garble) they were in a position of seeing a flare and I haven't heard of any bad weather condition in any one of those places, today. But I have not really had time to inform myself on that. The - Just to go along with the flare progress, the flare was first seen at 14:07 from the photomultiplier count and by one minute the astronaut had reported that he could confirm that the flare was (garble) from looking at the XUV that you are seeing now. And from looking at the various X-ray indications, a geiger counter and photomultiplier and the image dissector display, he has an extra display on board. All of them were possibly indicating that the flare was in progress and by 14:08, that is one minute later, he had already not only initiated the past experiments but he had also repointed to the active region 31. It is a fantastic performance, that we can't expect any better. It allowed us to go from 14:08 to at least 14:10 during the rising portion of the flare. That is extremely important because any clarification - the triggering mechanism for that flare may only come from that rising portion, that is when the explosion is really taking place. Here you see progress into the flare. You see everything brightening up so to speak around the region 31. So that must be very close to the peak maximum. This is - It must be an integrated intensity - XUV display. Yes.

QUERY Someone said earlier that when the flare first started occurring, the alarms went off, bells start ringing, lights start flashing, what really happened?

VAIANA (Laughter) The alarms went on, I assume. Yes. What happened is, that there is an X-ray counter - -

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VAIANA Lines weren't torn, I assume. What happened is there is an X-ray counter on board - it's a photomultiplier. And we set every day part of the planning - we set a threshold which says if that reading from that photomultiplier is more of a certain volume which is established on the basis of the sensitivity of the instrument, of the daily flocks that we expect, on how many flares that we have but we have not observed from Skylab, and so on. We establish that threshold in that way. Now once the PMEC goes above that threshold and the alarm system is activated, then the alarm will go on, and there's a - as we've said - there's a light flashing on board, and there is a buzzing noise which will allow the astronaut to stop what he's doing somehow and in some cases to come back to the console, if he's not there, and check that, in fact, it's not a false alarm, but it's a real one. And what he does - he looks again at the photomultiplier. He looks again at the XUV monitor that he is seeing there. He looks at the (garble) display, which is another X-ray monitor. If he sees that there is a bright spot in the image of the (garble) display, a bright spot in some active region position or on the limb in the XUV displayed, he would immediately initiate the flare program. He will first initiate 54 and 56 experiment. He would appoint confirmation of the flare. He would swing all the battery of instruments or try to swing all the battery of instruments to the point where the flares is developed. He will point the fine resolution instrument to the brightest portion of that flare and continue with the flare program with just - it applies quite a bit of switch throwing. Some of the programs go through very fast sequences during the rising portion of the flare and throughout the peak, and when the flares then decay, of course, you try to delay your data taking a little bit, and you go through the decay phase at a more - slower pace, so to speak. (Garble) to follow that activity. It didn't solve it today. The astronaut not only could do all of that very fast (And that was a very pleasant confirmation for us.), but also he was interested enough and excited enough to delay all of his later activities on shower taking and things like that. Do you understand he stayed there 15 minutes more than he was supposed to?

QUERY How long was the decay phase of the flare?

VAIANA Okay. The flare, as I said, started on 15:07 - at least - I'm sorry, 14:07 is when the PMEC alarm was set up. Some activity was noted in that region prior to that, and NOA now confirms that initial indication of flare - a matter of time, as early as 14:05 - all those numbers subject to revision, of course. Then the flare peaked at 14:08, and it lasted for more than 20 minutes hence. What I mean for lasted is that while it was gradually going down, one could still recognize flare activity.

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so to speak, of the decay type after 30 minutes. The total duration might go up somewhat once we know the details of it.

SPEAKER We do have the report that Dr. Vaiana has made up, and we will have plenty of copies in the news room on this flare event. Any other questions?

SPEAKER Dr. Vaiana, I believe you had to get some place by 2:00 o'clock; so we appreciate your coming over.

VAIANA Thank you.

END OF TAPE

SLYLAB NEWS CENTER
Houston, Texas

ATM Status Briefing
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Participants:

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Dr. Guisseppe Vianna, American Science and Engineering
Dr. Robert Noyes, Principal Scientist (with Dr. Reeves)
Dr. Jim Underwood, Aerospace Coorperation
Dr. Robert McQueen, High Altitude Observatory, Boulder, Colorado
Dr. E. M. Reeves, Harvard College Observatory
Dr. Richard Tousey, Naval Research Lab., Washington D.C.
Curtis Hunt, PAO

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PAO We are getting ready to start the news conference on the ATM experiments. We'll start in about 60 seconds.

PAO All right, we'll get started with the ATM experiments news conference. We'd like to start it off with Mr. W. C. Keathly, the Chief of ATM Experiments Branch at the Marshall Space Flight Center. Mr. Keathly.

KEATHLY Well, I just wanted to get over some of the hardware aspects of the thing before we turn it over to more exciting facts. The hardware in general is working very good. We've had two failures in the instruments, themselves. We had a malfunction of the S082-A camera, which as most of you know was replaced by Joe Kerwin in the SAS beam EVA several days ago. Since that time, we've had a failure of the S052 photographic camera. And that will be replaced on day 26 in the normal planned camera retrieval EVA. Now from ah - in the mean time, we are down-linking - have increased our TV down-link of that particular image to obtain the scientific data by way of TV. It's not the same quality of data, but it will suffice until we get our camera replaced. There have been two systems failures that have affected the ATM experiment operation. One of which you know about, the S054 door malfunction, which was repaired and opened by Joe Kerwin during the SAS beam EVA - and a deployment EVA. And it was pinned open, and it will remain open for the rest of the mission. The - There has been one other minor, well minor right now, anomaly. We haven't been able to switch the S054 main power off. There are ways to do that, but we're leaving it on, and it is planned to leave it on. It's a minor malfunction. As far as the hardware is concerned, I think everyone is pleased that the instruments are performing as they are and we trust they will continue to do so. I'd - Unless there's any questions about the instruments themselves, I'd like to just get right into the scientific accomplishments, since we've last talked to you.

PAO All right, Bill. Let me introduce the other experimenters here. One experimenter is still not here. He's, as you put it, chasing the solar flare - -

SPEAKER Here he comes now.

PAO Oh, there he is. (Laughter) He got here after all. Dr. Guiseppe Vianna just arrived. Dr. Robert Noyes on the far end down there. Jim Underwood, of Aerospace Corporation, you raise your hand so they can see? Dr. Robert McQueen of High Altitude Observatory. Dr. E. M. Reeves of Harvard College Observatory. Dr. Richard Tausey of Naval Research Laboratory. And Mr. Keathly I believe that Dr. Noyes is next in line with some slides, here. Dr. Noyes.

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All ght. Okay, Bob. Why don't you present the results of some of the results that you've seen during the past 2 weeks.

NOYES Let me begin by saying Dr. Reeves and I are here representing the Harvard S055 experiments, which you may recall is an experiment to look in the far ultraviolet simultaneously at many different heights in the outer solar atmosphere. Before I show a couple of slides, let me say that the data as we've looked at it, frankly exceeds our wildest expectations. We're absolutely delighted to discover that virtually every object that we've tried to look at, we've done successfully and we have seen, in almost every case, entirely new and different phenomena. The reason is because we have for the first time a high enough spatial resolution to see the fine structure of what we're searching for. Let me show you a couple of slides by way of illustration of the kind of data we're getting. I think we'll have to shut all the lights out. This first slide is a picture of the quiet Sun in - simultaneously at different heights from 10 - of temperatures of 10,000 degrees up through about 30, 000 degrees, and 100,000 degrees and 300,000 degrees at about 1-1/2 million degrees in the corona. And we have established that the network that we see in the quiet Sun does, in fact, break - spread out in many cases to be very diffuse. But there seem to be two fundamental structures in the corona, which are appearing in our data, not only in this picture, but, in fact, every time we observe. These little points here are a unique and fundamental feature of the corona to - By way of the scale, I minght say, that this is a picture covering about 1/6th of the solar diameter - -

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NOYSE - - the picture covering about 1/6 of the solar diameter and on this scale the size of these little points of emission, which we think are going to be quite important in terms of corona heating. They are about the size of the diameter of the Earth. They're quite big, about - oh, 8,000 miles across. And you can follow them point by point through all heights of the corona. They are undoubtedly areas of stronger than average magnetic field, quite possibly they're related to a bipolar structure of the field, although we haven't yet analyzed this in detail. We've looked a little bit at their evolutionary trends and we find that they do have a measurable lifetime of the order of many hours but we haven't yet quantitatively found out yet. But we do feel that they're going to tell us a great deal about the - about where the heat comes into the corona. Another area of study shown on the secon slide which shows a prominence as seen in 4 different emissions of the light of the hydrogen atom. These four are different - let me begin by again reminding you of the scale the size of the earth. For example, it's very - about that big here - so this is really an enormous feature here. It's a cloud of rather cool material at a temperature of perhaps 10,000 degrees emersed in the very hot corona. And it's very interesting to look at the difference in the way - when the prominence appears in the different emissions of hydrogen. We hope to learn a great deal about the temperature and the density and the physics of what's going on in this refrigerated cloud, if you like, by means of comparing these different colors. It's like taking a picture of a candle lame, if you like, at many different colors in order to determine the basic physical conditions inside the flame. That'll be all for the slides. I'll just finish by mentioning that we have observed active regions in great detail and seen enormous changes in the spectrum. We have pointed at individual points in the active regions and scanned through the entire ultraviolet spectrum, showing emission in perhaps 100 different ultraviolet emission lines, each of which gives us a different type of information on the physics. And we find tremendous surprises. Some lines are enhanced by very large factors while others are not. These may be directly related to very large density changes in the active regions. With those - few illustrations I'd like to close but remind you that we have looked at virtually every object with the exception, until now, of a solar flare, we had looked at every object that we had planned to do and seen basically the kind of results we had expected. We're now going back and looking into far greater greater detail, looking at many different spectral lines that we had not been able to look at the first time around.

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PAO Let's get to Dr. McQueen now who has the coronagraph, the S052 coronagraph.

MCQUEEN As Bill mentioned our camera failed Sunday night. Jammed after we had completed approximately 4,400 frames of observation of the corona over the first mission days. He also mentioned that we're now using through the courtesy of the planners on the ground and especially through the courtesy of the crewmembers additional TV downlinks of the coronagraph which you've seen on the TV from time to time to continue our study of the evolution and changes in structure of the corona. I think there are two high points in our minds that have occurred during the mission. Number 1 was the successful completion of what we call joint observing program 9, and that is entitled "Solar Wind." What this joint observing program tries to do is examine the corona in detail for a period of approximately 45 consecutive hours by observing pieces - by using pieces of observing time during those 45 hours. We did observe for 31 consecutive cycles with two interruptions in the middle on cycle 19 and 20 due to an EREP pass. We expect these data will allow us to examine carefully the corona for the possible identification of the passage of material out into the corona which comprises the solar wind flow. It's interesting to note that the total observing time that we consumed on the performance of this objective was about 252 minutes and if you take an average eclipse time as observed from the Earth that'd be equivalent to about 84 ground eclipses. And it's interesting to note that just in the performance of that one job we have accumulated more data than could be obtained during 84 total solar eclipses from the Earth. We think that the instrument is operating -

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MCQUEEN We think that the instrument is operating very well, as indicated by the TV downlinks. The TV downlink is of substantially lower resolution than our film resolution; so while we haven't seen that later resolution, we expect it to be superb in examining the details of the corona. The only other - the other point that, - objective that we've been able to fulfill is the observation of a coronal transient, which occurred, fortunately, the night before our camera jammed. And this was an erruptive prominence on the link which was observed from the ground, uplinked to the crewmembers, they went into a trancient observing program. We did continue the observations of with the coronograph through the unattended period during the night, and of course as you know, we haven't seen our film yet, but we do know from an observation of the NRL coronagraph, the small coronagraph which is flying on OSO 7, that at the end of our observing period a large transient was in the corono, a large blob of material was moving out in the corona, and we hope very much to use the geometry of this phenomenon and the electron density to infer what is going on in the corona and how the corono is perturbed by the erruption of this prominence from the limb.

PAO All right, I think Dr. Taussey was next.

TAUSSEY We've had a very busy week, indeed. Starting off, with the exchange by Joe Kerwin of the malfunctioning S082 camera. Of course, we don't know how badly it malfunctioned, so we're on tender hooks to see if we got a dozen good pictures or a hundred good pictures, there isn't any way to tell until we get it back. But, anyway, the replacement camera is working very well, and has been operating for a week or so, it's well on its way to exposing all the film, 200 film strips, prior to retrieval by EVA and I understand that it was operating in the fast mode during the flare that you'll hear about in a few moments. The other instrument the spectrograph, - the first one, the A, takes pictures of the sun in many different wavelengths, such as you saw Dr. Noyes show portions of it with, - taken with an electronic method. The other camera, the other instrument, takes spectra of very carefully selected isolated regions on the sun, and can take 1600 exposures. We're also well on our way to finishing up on those. I think we've had a sampling of just about everything, including atmospheric absorption, by operating through into sunset. The other complication to our lives this week, was the launch of the calibration rocket at White Sands, which has been a job just about equal in complexity to the preparation of our ATM instruments. The, - we have 2 calibration rockets, we had 3, but the first one was not successful, it was an engineering round, this one was completely successful, and contains half size more or less, half size

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instruments like our A and B instruments together with a couple of other instruments associated with the very difficult process of, of calibrating the extreme ultra-violet film and instruments. In brief, the idea is to standardize the sun, and use that as a standard source with which to calibrate the ATM instruments, but you can't bring the sun into the National Bureau of Standards. So, we take our rocket instruments to the National Bureau of Standards - of our rocket instruments. Calibrate them there or collaboratively with them, then launch them before there's any chance, enough time has passed to change the calibration, which is unlike the instruments in the ATM, expose on the sun, get the pictures back and derive the precise radiation intensity at many wavelengths of the sun. At the same time, the ATM was taking pictures of the same places on the sun, so that they were calibrating the ATM instruments by means of the standardized sun.

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TAUSEY A great many people were involved in this, and for the purpose, the Black Brand 5 Canadian-built rocket was used with the Ames Research Center pointing system. And the command system developed especially for this purpose. The re's a TV system on the rocket, which enabled Dr. Brookner, my associate in charge at White Sands, to watch exactly where the instrument and rocket instrumentation was pointed. He had a picture of the Sun on the TV screen, and a little joy-stick of some kind with which he could command the rocket to point. He did this and the rocket responded properly. We haven't seen - developed all the pictures yet, but the ones we have seen are extremely good, and we got the instrument back and everything is fine. I haven't seen them, myself, so I guess I may as well stop at that point.

SPEAKER Well the point is, that we were 99 percent sure or positive that we've collected sufficient data off of the calibration rocket to calibrate the ATM Skylab instrument and we're well assured of that point. All right. I guess, Dr. Vianna will now discuss the event we've been waiting for some 18 days to get. The sun finally cooperated and Dr. Vianna, why don't you proceed with that discussion.

VIANNA Yes. I suppose something regarding S054 instrument, but meanwhile we're going through the notes and things like that, and what have been on this past week. We received a call from the science room stating that we finally had a sizeable flare, what we call an M, perhaps 5 or 6 flare, and the Astronaut was on it. So I started to chase with the (garble) been able to construct and find out what went wrong. Of course, my notes are very sketchy and they may contain some missing information at this point, but the basic fact is that we finally got a reasonable size flare for that mission. You might recall that when the other day Owen Garriott was briefing the astronauts he was explaining, for instance how the photo multiply, what do we call it, PMEC and the image dissector were working more or less nominally and that they should simply be patient. And we were all trying to be patient at that time. Well what happened this morning, is that, while the astronaut was on conducting a prominence program, he was doing what we call a building block 3. Essentially, he was looking at the prominence before, which, as I recall, close to the east and active region, active region 37, simultaneously at some of our consoles and the astronaut - it was over a pass. And the astronaut console, itself, was starting to see a consistent increase on the photo multiplier counts or current, as we should say. And he went reasonably sudden over flare threshold, which was setting at 640 normal counts, or around 300 or so. As soon as it passed 640, instead of going halfway fast, we announced to the

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(garble) to advise the astronaut that we had gone above threshold. Of course, by that time, the astronaut knew it himself, because the flare alignment triggered and he looked for confirmation from what he told us. He looked for confirmation of that throughout the - all of the other instruments. And very soon, he got it essentially from all of them. Some of his statements are more or less as follows: We have seen the flare, we are sure of it, and we are going after it. We have seen finally a very bright spot on x-ray, image display - - yes - The x-ray image display a very bright spot. We have seen on the XUV monitor a brightness 10 times whatever the surrounding brightness is. All monitors in this place are showing it. Meaning, I think, that the H-alpha was showing it. Along with that conversation, Noah came back after several minutes, and said that - that confirming active rigon 31 was having a flare event, active region 31 is more or less north of the - It's north of the equator, it's about to the center of the Sun. And, then the astronaut said that they had gone with the time more or less, he was doing and the flare as we started to see, - of course, I (garble) that a little bit. It started to go off at about 15 to 7. The astronaut is supposed to have done a repointing. He was on a prominence east of it. He was - He did the repointing just one minute after that, which means that really, we're waiting anxiously for it. - -

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VIANA He's permit that he was repointing just one minutes after that, which means that they really were waiting anxiously for that event. On 14:08 the start of the flare program having repointed at the flare and the flare peaked at 14:10, so we apparently have 2 to perhaps 3 minutes of rapid increase of flare event. Now the magnitude of the flare is - in the X-ray for instance, is suspected to be, can give you some numbers, the photomultiply reading was at 850 at peak, which normally is 250 is a log amplifier that means essentially that several hundred times. It would with the normal background, would be the image dissector, which is another indication that it went from 12 more or less during background count, to about 300, so that's a confirmation of it. That would put that flare to an energy magnitude of the order of 5 times 10 to the minus 2 ergs per square centimeter per second. Is, yet not to the biggest flare, one would have to get during the duration of that mission, but is certainly one we have been really waiting for. The, going after that flare has confirmed that essentially all systems onboard were set out for that flare watch were working, and also confirmed that the astronauts are performing very brilliantly on that thing. And so far as the expectation of the data is concerned, as I said, we saw 3 minutes of rise, within 2 to 3 minutes of rise of it, the peaking of it, and the last time the astronauts were going over Vanguard, the it was still in the post flare mode, he delayed his shower and other activities, he's staying in the panel about 15 to 20 minutes, maybe more, but at least 15 to 20 minutes estimate of best time for completing the post flare program. So, we are very happy.

PAO Let me interrupt here, Gentlemen, I've just been notified that the, in about 3 minutes we'll have acquisition at Goldstone, we don't have word yet for sure, but there may be television downlink at Goldstone. If you would like, could we interrupt the press conference and just watch and see if we get it in about 2-1/2, 3 minutes here.

SPEAKER Okay. Why don't we continue on, Jim, until acquisition, where we'll probably interrupt you, Jim, but why don't you continue and we'll make use of those 3 minutes.

UNDERWOOD Well, of course we won't be able to evaluate the data we get from the flare until all the film comes back, but to myself, I think I can deduce a few properties of this flare, which seem to violate a lot of known laws which are thought to govern some of the flares, especially as some of my colleagues, like Dr. Noyes and Dr. Vaiana, who have worked on the unmanned satellite program a long time, know that all flares, all flares of interest occur while your satellite

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is on the dark side of the orbit and this flare certainly violated that and with a manned program it also had the potential of being convenient in a lot of other, inconvenient in a lot of other ways. It could have occurred while astronaut Kerwin was in the shower, it could have occurred while we weren't over a ground station. But it didn't do any of these things. We were able to see it from the ground. We were able to see that the flare was in progress at - simultaneously at the same time as the astronauts were observing the flare indicators. The Pilot was (garble), I beg your pardon, the astronaut Weitz was on at that time, Dr. Vaiana informs me, and I understand one comment they - we've had was that when the flare began to erupt there were six hands on the console, all assisting in the various switch throwing that had to be done. There's quite a lot of reinitiation of modes which has to be done when the flare alarm goes off, because a lot of the instruments go into a faster mode, so that they can get the time result data needed to see what happens during the important rise phase of a flare. Now, it is important that we have got the rise phase of the flare in this particular observation, and this is the first time such an observation ha· been made and it will tell us a lot, I sure, about exactly how a flare is triggered and how it grows during the first vital 2 or 3 minutes of the flare process. So, this flare, I'm sure, will be studied most intently by all the experimenters that have data on it and I'm sure we'll learn a lot about this particular flare and in general a flare mechanism from these observations. Of course, all flares are not exactly the same. This was a fairly big one. We've also had a few medium to big ones, but we've also had a few in the past few days, a few smaller flares, minor flares, what we call the C-class of flares, which is 10 to minus - a few times - 10 to minus 4 ergs. And these as just as interesting in their own way as the larger flares because they show how the flare phenomena can manifest itself in different ways through the smaller to the larger to the very biggest flares that you can get, which we haven't got one yet. In general, I would say that the Sun has been very kind to us and been very cooperative through this mission. We've had a wide variety of phenomena, I can't think of many pehnomena that have not been seen or not been observed. We've had, as Dr. McQueen said, eruptive prominence which, he was able to run his coronal transient program on. We've seen several so-called coronal hull which is a fairly newly - -

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VAIANA - - is able to run his coronal transient program on. We've seen a so-called coronal hall, which is a fairly newly discovered phenomenon. This is a lack of emission in the ultraviolet, in the X-ray regions of the corona, and it's thought by some, including my colleagues at AS&E, to be connected with the production of the solar wind. We've seen a wide variety of active regions. We've seen old regions die away and decay to just little enhancements and bright spots in the general coronal network - I mean chromospheric network. On the other hand, we've seen small regions spring up and ie away within a few days. They are quite interesting. It's not known why some regions spring up and last a long time, become large regions, where others just die away within a few days. And we've seen the latest really good region, active region - 37, was it? Which was the one that flared? Active region 31, which is not the biggest and important region on the Sun right now. But - However, it was the one that flared. Active region 37 is quite a large complex and shows intricate and interesting structure that we hope we'll be able to study in the various wavelengths with - well, we shall study in the various wavelengths which - on the ATM and, of course, are inaccessible to the ground and so on. And I think that all experimenters in general are very pleased, not only with the performance of their instrument, as we are, but with the wide variety of phenomena which they've been able to observe during this mission. Thank you.

PAO I guess - Curtis, do you - do we have AOS yet?

SPEAKER We have AOS, but we're not getting data from the ATM. They're getting something else. We're standing by just in case it does; so if you'd like to go on, Bill, with the next speaker.

PAO Ed, you want to say a few words.

REEVES I think I might just say another word. From what Jim said, the value --

SPEAKER Jim Underwood, why don't you get down there and maybe point out some of the features --

SPEAKER This is a recording that was dumped? Would somebody like to explain what they're seeing. Jim, why don't you try it. You're the closest over there, I believe. Whoops, we're going to lose it by the time you get down there with it. We lost it already. That was a take while they were observing and then on tape and then dumped right afterwards. That's apparently - (garble) one, I guess. (laughter)

SPEAKER All right. Dr. Reeves, I think, had a few comments he wanted to add, and then we'll open it up for questions.

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REEVES Yes, we were indeed very fortunate on the Harvard instrument, also, to get a flare this time, because the two NRL experiments, NRLB experiment and the Harvard experiment, which have the smallest fields of view, are the most improbable to be able to actually get on a flare. Reference was made previously to experiments from OSO6, where we tried many many times to get flares, waited for hours and hours, and they always would break out somewhere else than where they were expected, as did this one. And by the time you're over a ground station, a few minutes per pass, you can never correct it and go and catch the flare after it starts to break out. Here, of course, we were very fortunate. The flare did happen over a ground station, and in addition to that, we had an astronaut on board. And this is exactly one of the functions that the - that justified the manned program - is that he can interrupt his shower, or whatever he's doing, and dash up to that console, use his onboard instruments, and make an assessment of where the flare has broken out, move the cluster of experiments over to it, and change the experiment mode. Our particular experiment at the time was operating in the so-called raster mode that takes pictures every 5 minutes. A 5-minute repetition rate for studying flares is very uninteresting. That's the H-ALPHA with the reticle pointing right at the active region, looks like. That's the XUV. There it is. And what we do is then take those integrated images and produce still frames, and that's what you may have seen in photographs. We didn't get a continuous picture. (Laughter).

SPEAKER As I say, he was in this 5-minute time frame mode, which would have been very uninteresting for us, but he switched us over into the line scan mode where we get data every 5 seconds. Peaked the detectors up so that we were looking simultaneously at the polychromatic position, all the layers of the solar atmosphere at once. Just got it into the absolutely perfect operating mode for us, as I'm sure he did for the other experiments. And we're looking forward to getting that data back down here in a few hours. We'll get it through the data system here, and by this afternoon we hope to have a chance to start looking at it.

SPEAKER All right. I guess we can open up for questions now.

SPEAKER Okay, when you have a question, please wait for the microphone. Questions. Abbe.

QUERY Exactly how large was the flare in the number of miles across, and can you compare it, as far as its energy, to anything that, you know, that we would know?

VAIANA This is the first photograph we have seen of it. The report from NOA was saying that in the optical was not a particular big flare. It was not in X-ray either. The

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size, we're saying, was a medium flare. The preliminary NOA report, it was what is called the 1 bright flare. Now 1 means roughly that orbital magnet is the overall size - integrated size is 1 minute of arc across. So that means of the order of --

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VAIANA -- the overall size, integrated size, is 1 minute of arc across. So that means of the order of 40,000 kilometers square, right? I might be wrong by a factor of 2. Well, at the most, but I don't think so.

QUERY You can see though from the - -

SPEAKER 40,000. I'm sorry, 40,000 by 40,000. I don't mean 40,000.

PAO It's 40,000 kilometers by 40,000 kilometers.

SPEAKER You can see from the extreme ultraviolet image, that bright point, that in the radiation from the really hot constituents of the corona is just a small spot as usual and not this great long thing that you see in H-alpha.

QUERY And in looking at the TV picture, can you say anything specially about this flare? Is it different from any other kind of flare?

VAIANA Well, uh, I think (garble) closely looked at something like yourself. Obviously can't, but generally speaking is what is - what would be a flare which is bright in XUV and X-rays, more than it would be in the H-alpha. That means that, presumably, the high energy processes that are taking place in the transition region of the corona are more important than the - I was going to say the decay process that takes place in the low chromosphere, but that is - depends on my interpretation (laughter) of what the flare process is. But in - generally speaking, is what is called an energetic flare - not in the sense of total amount of radiation that comes out but in the sense that it does have associated phenomena that enhance the transition region, tjat enhance the XUV, and then onto the X-rays, (garble) the optical process.

PAO Anybody else want to add anything to that?

QUERY Could you review again how long did we see this flare - for how long and for how long afterward?

VAIANA Of course, I don't have the fine details of it, but again the optical starting time, which typically means, when somebody really got down to it, to observe it, is 14:07. The 14:07 means 9:07 our time. The astronaut got on to it; that is, got the fine pointing at 14:08. I should indicate that several of the instruments on board were wide field of view. And while we were doing observation of prominence, within the field of view of those wide field of view instruments, there was also this active region. So we had got along peacefully - watching of it, so to speak. Perhaps not vith the best of time resolution, but certain we have a configuration of the active region before it did flare. So 14:07 to 14:08 the astronauts got on to it. It maximized at 14:10. That's the peak of the X-ray, X-ray event. At that time, in the X-ray monitor, we estimate that it was equivalent to what is called an M5, M6. That is 5 to 6 times ten to the minus two ergs per square centimeter per second. And the,

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uh, the, uh - At the end of the Vanguard pass, and I do not have that time exactly, but the end of the Vanguard pass it was still going on, although wa decaying down. That is, I would estimate that the flare might have lasted 20 minutes all together. And the astronaut was running a post flare program in addition to those 20 minutes.

PAO Another question.

QUERY In just common simple language, why is it so important to spot a flare and what do you hope to learn from it?

VAIANA Well, a flare has been one of the most intriguing solar physics phenomena, and no one has been able to understand it, although they appear as (garble). I think that the layman term description of flare - I'll put it this way. We know that active regions are manifestations of the magnetic field on the Sun. That is, where the magnetic field is strong, there are those appearance of high intensity field of cooling. And the overall activity of the Sun, related to the solar cycle, is related to the presence of those active regions. Now, occasionally, those active regions simply start to release a tremendous amount of energy in a very short concentrated time, of the order of from a few minutes to several hours, on this sort of time scale. The mechanics by which - the amount of energy one is talking about is - it can go as high as (garble) higher than the present day flare, for instance. Now such an event is so that energy release is so huge, to be something like 1/10,000th of the total solar radiation, when is a big event like that, and can go up to 1/100th of the total radiation from the Sun. Now there is a tremendous amount of associated phenomena that are important both for the physics of the Sun and for the physics of the Earth as well. That the flare is felt at the Earth as a particle - -

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VAIANA are important both for the physics of the Sun and for the physics of the Earth as well, as the flare is felt on the Earth as a particle event, as an event which can be trapped communications which affects the overall ionization layers and therefore it is an interesting phenomena from that point of view. It's magnitude is important, the effect it does have are important. We don't the basic physics of it. The few things we know about it - one could list them but we think that the energy which is suddenly released somehow is stored in the (garble) reservoir of the active region. But how those energies can be released so suddenly is not at all understood. It is clear that in doing that - the time in which the energy is suddenly released there are the violent accelerations taking place - acceleration of energy particles, at lease during some of the biggest phenomena. Again, how that operation takes place is not clear during that quickening moment. So there is a whole range of things, from its magnitudes, its effect. The basic understanding of the physics of it which are totally intriguing with respect to the event itself.

QUERY How many solar flares have you observed from unmanned satellites?

VAIANA It depends on what the wavelengths are and I guess each one should answer that question.

QUERY How significant is it for these astronauts to be able to spot a flare and they can get it right from the beginning, is this the first time you've had such good coverage of a flare on the Sun?

VAIANA I'll answer for X-rays. In the X-ray field time resolutional flare, particularly the increasing portion with spatial resolutions, no one. This is the first time.

SPEAKER I think that's probably true of all the experiments. The - that there are two main strengths I think that aid in significance to ATM observing this flare. Individual experiments here have seen flare phenomena from unmanned satellites. The spatial resolution and temporal resolution has been less. The really significant thing here is that they were observed with the best instruments that have ever been built and all simultaneously so this is the first time that we've really seen the H-ALPHA taken from exactly the same spacecraft at the same time to correlate with the ground the EUV photoelectric, photographic instruments, the two X-ray instruments - we're all observing with the best resolution that's ever been achieved - temporal and spatial and the great strength is that this was all simultaneously. So although we've had bits and pieces of it before we've never had the opportunity for such comprehensive coverage.

SL-II PC50H/2
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QUERY How large a loap is Skylab offering for your scientific field? How large an advancement of your scientific field is Skylab offering you?

SPEAKER In general?

QUERY In knowledge, you know like -

SPEAKER It's really significant. If you want to know, it's hundreds of times bettor than anything we've had before. You get this tremendous gain from having the big instrument - each of the big instruments onboard Skylab of the ATM type are significant improvements over what they've been before by at least factors of 5 to 10 in one important parameter or another. And then they say the collective effects of observing these things simultaneously and the organized coordinated programs from the ground, you know, it's just hundreds of times better than qualitatively I guess - semi-quantitatively.

QUERY Let me point out one qualitative difference and that is that having the man in the loop and able to make these observations enables you to do a completely different kind of experiment than you can from an unmanned satellite. Now if we had been observing today from OSO or the orbiting solar observatory - not the OSO but the OSO would have been observing the prominence and when the flare went off, there would at the present time be no way that it would have been sensed up there and go over to it and turn on the instruments to a different mode. Having the man there enables him to do this and make a judgment as to whether the event is sufficiently important to go over there and to start all these instruments in the flare mode which is the optimum data take in fast-time resolution for flares. And so this is something that has not been done before and to this date the unmanned satellites do not have that capability.

QUERY I have a general question. Would you gentlemen agree that on the basis of the data that is seen and which you believe you've got - you could almost make a correlation that you're getting the same order of magnitude - understanding of the Sun with Skylab as Apollo has done for the Moon?

SPEAKER I think that you have to be very careful in answering that. In a very real sense solar physics is a mature science. So the kinds of things we're learning are quantitative and are extensions of or elucidations on presently existing theories that have been developed as a result of observation for several decades. In the case of Apollo there existed theories, period. There were basically no observations except those of reflectance of the Moon in the light. So in a very real sense the Apollo was the - was an entirely different step in understanding lunar science. It was really

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the first step - first true step in understanding lunar science. This is - Skylab is the - if I could put it this way, is a sort of a crowning achieverent now of several decades of intensive study, not only from satellites but from more sophisticated ground based observatories. So it's a different kind of ball game. Equally important, maybe in our own biased way more important, but a different kind of -

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SPEAKER - - ball game. Equally important, maybe in our own biased way more important, but a different kind of study than one might consider when speaking of gathering rocks and understanding the - terrible terminology - the geology of the Moon.

QUERY What I was referring to is say the magnitude of new knowledge that you're getting as a result of the fine instrumentation and having a manned spacecraft doing this for the first time.

SPEAKER Well, it's - As Dr. Reeves had said, it's going to increase our knowledge. It's an improvement over the present state of knowledge of the solar physics by some orders of magnitude. You want to say two orders of magnitude, one order of magnitude, three orders of magnitude. It's really difficult to say. If I can use an example in terms of the coronagraph on the Skylab. We're going to observe the corona with a spacial resolution which is approximatelt equal to that at any solar eclipse - not quite as good, but approximately equal. We're going to do it for 8 months. Well, the total sum of those observations will far exceed what man in all recorded history has ever observed the corona. So in that one particular experiment, we're seeing an increase in our knowledge of observation of the corona that's unparalleled.

SPEAKER Another thing that one might say about it is that Skylab is expected to produce data that will aid in solving the most perplexing questions in solar physics, that have arisen only in the last few decades. One of these is the high temperature of the corona, the million degree corona. It was not until the middle 1940s that anyone realized that the corona had a temperature in the millions of degrees. They thought that there - the sun's temperature just continued to decrease outward and didn't realize that the corona, which has been flashing by here, has that temperature. (Laughter) He's rolling. It's still not understood very well why it has this temperature. Neither is the flare mechanism understood. But we feel that the Skylab Project will go a long way toward providing answers to these very perplexing questions.

QUERY Despite the fickleness of flares, do you expect another - Are the chances good for another on this mission, and are they better on the next couple of missions?

SPEAKER Well, just on the basis of how often these things break out, we are now at a time of solar minimum. So the probability of flares per hour is about as low as it gets. The probability of another flare of this size breaking out in the next three days is very, very small. It's - Of course, you need an awful lot of statistics before you evaluate large and small. The chances, if you like, of getting a flare of this size in a hundred hours of observing time, at this time in the solar cycle, did not come anywhere near assuring us that we'd get one. I think it was something like a 30 percent chance that we would be able to observe a flare of this type in a hundred hours of observation at this time of the solar cycle. So we were lucky, because we had something like 80 hours of total observing time on ATM - manned daylight observing time. So the probability in the next few days is very, very small. However, the nature of these flares is such that they're not accurately predictable. They're statistically predictable. And whether one will break out there that's a "duzer" tomorrow, nobody knows. Certainly in SL-3, where we have something in excess of 200 hours planned observations, we will have another very reasonable probability of being able to observe a flare of some type.

SPEAKER I'd like to add very briefly that, unlike the adage about lightning, there really is a tendancy for flares to strike twice in the same place. So in the next few days we probably will be thinking about this active region 31 then - -

END OF TAPE

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SPEAKER There really is a tendency for flares to strike twice in the same place, so in the next few days we probably will be thinking about this active region 31 and be unusually aware to the possibility of a flare reoccurring there.

SPEAKER We might also add too, that the region in which the flare occurred, and I don't mean this to the ground, to degrade our good friends at NOA who worked very closely with us on the prediction of various flares, but this region M31 has been declining for the last several days. The highest flare probability, and in fact the flare probability that was advertised by the PAO to you yesterday as saying the ATM hrd a 50-50 chance of observing a flare, is in an entirely different region. So, the most likely region to flare in terms of complexity and activity is region 37 and 41, which is on the other side of the disc.

VAIANA I think this region on 37 and 41 are still I guess there'll be something happening there, but I would like to say that already having seen that flare on 31, with another active complex on the other side, is a very important piece of information, also for this complex of activities. There's some chance that we're going to see what the effect of one flare is in one active region onto that complex of activities which is on the east side and somehow we would be using the flare as a probe for the thesis that can be done by the complex of activities, we are fortunate to have those, this Sun situated that way.

PAO Question from Abby.

QUERY Dr. Noyes, the pictures that you've shown, is this the first direct evidence that that network extends so far out into the corona and what does this tell you about the heat transfer process?

NOYES This is a difficult question, I think it is the first evidence at that high an altitude in the corona as to what the actual struture of the network really is. And I might add, that we have evidence of even higher heigths (garble). I just didn't happen to have an illustration, we have followed it - the struture's considerably further out. The actual distribution of the heating has to be gotten by careful analysis of the flow of energy that we can infer from looking at the intensities. In a fairly complicated way we can actually infer how much energy is required to maintain the density and temperature structure we see. And so we can determine what the actual energy inputs are that are required. And from this we can hope to get some idea as to where the energy actually does come in. I might add that we have made observations looking for the detailed temporal deposition of

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the energy and we do see indications that there are rapid changes even in the quiet sun that may be related to the heating, but we, it's far too preliminary to say that we definitely have the solution in our hands.

PAO Do we have any more questions? Mr. Keathly, would you sort of like to summarize or wrap it up with a statement?

KEATHLY Well, I guess, I think that the principle investigators have spoken for themselves, as far as the science is concerned, as far as the operation of the instruments are concerned, it's very self satisfying that they are performing this well, and recording the excellent data that they are recording, they're obviously recording. I think we're going to see some tremendous photographs when we get them back after splashdown.

PAO Well, thank you very much, Gentlemen, I announced to the press, we do have the correct spelling of the names of these gentlemen, out in the press room here and the organizations with which they are associated. Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 15, 1973
5:19 a.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
Terry White, PAO

SL-II PC49A/1
Time: 05:19 CDT
6/15/73

PAO Change of Shift Press Conference, Neil Hutchinson off-coming Flight Director will zap over the quiet night and what they've got planned for today.

HUTCHINSON Last night we had another quiet night just like the other two or three. I guess you guys have noticed this is a bit early. It'll be a bit earlier tomorrow morning. We will be - have our Circadian swap finally completed tomorrow and we will be handing over at 4 a.m. So I'll be over here about an hour earlier tomorrow. Let me see if I can sort of regroup on what's been going on. First off let me tell you a little bit about - you all ready know about what we're doing today. We're running minus 7 entry date checks and pretty standard set of experiments today. There are no real big bitties. The crew is keeping ahead of us on several things. You may have heard quite a bit of discussion about S073. They seem to be conducting experiments faster than we can get them scheduled. And we spent probably at least an hour's worth of time - not just last night but night before last - getting S073 all set up and in the schedule. And then Pete jumped the gun and got some work done on it, got it in the SAL and got it going before we thought he would and so tonight - last night we replanned it and trying to pick up sort of where he left off and we also changed all the stuff that we had in the flight plan today for S073 to maximize the number of runs we're getting. And, of course, I'm certainly not complaining about him getting ahead of us in the experiment world. Also on M553 this morning we intend to do one more run on 553. We're going to melt one more sphere and then we're going to take it out of the chamber and go to work on 552 which is the brazing experiment. Those are the only real changes that I know of to the Flight Plan that came out for today. You know we're running the 7 day entry checks where we're going to power up the CSM guidance system and take a look at it and so on and so forth today. Tomorrow - day 167 - the 23rd mission day - a little bit better than half the day is taken up with a thing we call entry sim which we discussed yesterday which is pretty much a accurate timeline and activity representation of what the CSM does from undocking to splashdown. And that takes up most of the morning and about half of the afternoon tomorrow. And then we have a medical run and some ATM work and more S073. I might give you just a slight rundown on some of the flight planning that we've been doing to home in here on the end of the mission. As far as the SAL goes we're going to run S073 tomorrow like I said on day 167. On day 168 we have a trim burn scheduled, two trim burns in fact. It's really one trim burn and we're splitting it in two parts to minimize the TACS cost because you remember we use the

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TACS attitude control system - the whole attitude while we're doing a trim burn. Purpose of the trim burn will be to set us up in a nominal orbit for Skylab III and it will be nominal. It'll move the ground track back over the premission nominals. And also establish the 5 day repeat. So as you recall we didn't have enough gas on Skylab II to get the ground track sending nodes back to nominal so we've been running the ground track some 60 miles or so - I forget the number - west of where they were planned premission. But for Skylab III since we have some time to let the energy propagate - let the correction propagate the orbit will have shifted back. The nodal crossings will be right and we will be going over exactly the territory we had planned before Skylab I lift-off. That's going to be done on day 168. Day 169 or mission day 25. Well let me talk about the SAL for a minute as we're going through these days. Basically in the SAL we're going to try and get - we're going to finish off S073 in the next day - day and a half. We're going to try and get S019 back in the SAL for 1 day. And then we will put T027 in there, the sample array for 3 days and of course as you recall we put S149 in the SAL as a part of deactivation and it stays in there for the whole time period while the crew is gone. So that pretty much is the SAL usage for the rest of the mission. Of course we're continuing the Med runs - 92-171 every day. One crewman a day. The last day - day 168 - the last M131 run is being done on day 168. Interesting note on that we've increased the revolutions per minute to the maximum of 131 up to 30 rpms for both the crewmen for that final run. As you know that's been one of the real interesting things that have come out of the medical thing in the fact that they've experienced no reactions whatsoever to the 131-1 runs. Day 169 is a fairly standard day with ATM and two MED runs and the EVA preps. Day 170 or day 26 is the EVA and then we're pretty much on our way closing out. Day 26 is the EVA. We stow the ATM film in the CSM - day 27 is transfers and that's literally when we take all of the rest of the stuff that goes into the CSM like EREP tapes and sample arrays and it's return stowage almost the entire day. Day 28 is deactivation and Day 29 is come home. That's kind of a quick rundown of the way the rest of the mission shapes up. I just don't have a heck of a lot on systems. One thing that happened yesterday and I'm not sure how much Bill touched on it last night, you know that we ran that test on the secondary coolant airlock module coolant loop to verify that we could bring the suit umbilical system up on it in a controlled manner and it appears that we've stuck the TCVB valve again. This time it hung up in about 46 degrees. We're pretty sure it's hung up. It's not controlling. It's just

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sitting there instead of hanging up in a cold position we were careful when we brought the SUS loop on to modulate it a little bit at a time and it moved off 47 a bit and it hung. Remains to be seen how we're going to work the SUS loops for the EVA. I suspect we may try and free the thing again like we did last time. Of course we always have the option of running the EVA on the prime loop with both SUSes hooked to the prime loop which is the way we ran the last EVA, except we did it on the secondary loop. It appears anyway that the contamination, whatever it is that gets in there and hangs the valve up, is still around, which you might have guessed. We've - the Skylab mobile laboratory - I gave them a go last night to load the mobile laboratory on the Tico and it's being done right this minute. And they had an uneventful flight to San Diego and they're in the process of loading up today. I think that's about it. One more comment on the CSM power transfer - it went very well yesterday. We were running about 1100 watts in the CSM. We've got the polychoke set up and are bleeding off the remaining CSM oxygen into the workshop atmosphere at about 13 pounds a day and it all went just exactly like the book said it was supposed to. That's about it.

QUERY Did you mention the EREP possibility?

HUTCHINSON Oh, no. I sure as heck didn't. I don't know a heck of a lot about that, Art. It turns out that NASA management has a request for consideration of an EREP pass late in the mission over Africa. Now the whole thing is in the planning stage. We did some work on it last night. We didn't do a lot of work. We're looking at how much TACs it might cost us - what instruments we might use to best get the things that they want to get. I don't know a heck of a lot about it other than it's an area that's been suffering severe incredible droughts here for several years and apparently this year is worse than they've ever seen it before and they're trying to get some overviews on the total water situation, vegetation situation, et cetera. The day we're looking at right now if it pans out and by the way there is no NASA management decision on having another EREP pass and I'm sure there won't be for another day or so. The flight team is indeed investigating what it'd take to get it done. And the day we're currently looking at is day 169.

QUERY Okay. Are there some other contingencies involved, for example, and I'm not sure that I'm right in this but perhaps if they do not deploy the twin pole on the EVA that'll make the EVA shorter and you'll have more time for it - I mean somethings got to give in order to put the EREP in?

HUTCHINSON Well, I'll tell you. I think that depends.

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HUTCHINSON I think it all - that that depends. First let me comment on the EVA day. The answer to that question is no. The twin-pole EVA being in there or not would not have any effect on the EREP. It turns out that lighting conditions are correct for this thing very early in the morning, right after crew - not right after, but it'd be what we typically call an early morning EREP, and I suspect that we wouldn't do it before the EVA. I may end up having to eat my words, but I suspect we wouldn't. Even if we only did the single EVA, I think we'd like to concentrate on that and get it out of the way, you know, as a prime activity at the beginning of the day. It also is not, certainly is not a full blown EREP pass that takes - Of course, depending on how many instruments we turn on depends on how much setup time there is and depending on how long the ground track is they'd want to shoot, would, you know, but it - at a preliminary look, I'm sure we wouldn't be turning all the instruments on, and we may only turn on a couple three. And at a preliminary look, it would look like it wouldn't be anywhere near as significant as a standard EREP pass in turns of total amount of time consumed. So I expect it can be fit it, jockeyed in among some of the other experiments there, on one of those last mission days. 168 is also a candidate. 167 is definitely out, because that's our entry sim, and it's early in the morning, and it has to be done then to stay on the proper ground coverage and timeline.

PAO Bruce, do you have a question?

QUERY Are they doing, or is one of the unattended experiments, I couldn't find it on the Flight Plan, ED31, a bacteria experiment?

HUTCHINSON I forgot it, to mention it too. Yes, sir. ED31 was initiated yesterday, and it's one of the student experiments, belongs to the biomed folks. I don't know a lot about it except they're growing bugs and cultures and taking pictures of them. And it is in work and going full blast and was started yesterday afternoon.

PAO No more? I guess that ends it then. It's one of the shortest press conferences on record. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 14, 1973
5:30 p.m. CDT

Participants:

Phil Shaffer, Flight Director
Bob Gordon, PAO

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Time: 17:34 CDT
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PAO I think it's hooked up. We can go. Okay we have Mr. Phil Shaffer, Flight Director, and we can let him give a summary, and then we will have Q & A.

SHAFFER Okay, today was the day for what we believe was the last EREP pass of the Skylab 2 mission. It was followed immediately by the EREP calibration maneuver and data take, where they use the moon as a known light source and a target for the EREPP instruments and took that data. That all appeared to us to go vary,very well. All the scheduled ATM passes were accomplished. Power transfer was accomplished. There were no problems with that. The OWS is now supplying the electrical power to the CSM. All in all, it was a good day with very few problems that amounted to much of anything. Tomorrow we do the - what's been refered to as the entry minus 7 day checks, where we power up the CSM and check out the guidance and control systems, take a good look at the propulsion systems, do some electrical checks between the guidance system and the propulsion system and just in general find out if we've got any problems that we need to consider in the week remaining before we end the Skylab 2 mission. We have ATM passes scheduled tomorrow, some corollary stuff and the usual medical that goes on every day. As an overall summary, we cranked along yesterday, we cranked along today, and we're doing good. In fact, we got some extra things done today. The original summary flight plan had scheduled some S073 installation and setup tomorrow. That was all accomplished today, so in the original plan blocks that had setup of S073 tomorrow will be operating that instrument. Picking up some stuff. An extra experiment is planned to be started this evening, which is DB31. And I don't know a lot about that other than it sounds like a bacteriological study where they're gonna start some growths and take some pictures of them and see how they behave in the space environment. We had a question last evening about power availability. Right now on day 165, which was today, our continuous power capability is about 7000 watts. And that's averaged over the day, night cycles. The average load, nominal loads, experiment loads and the CSM is about 6500, so we have a plus there of about 500 watts. On day 170, the Beta angle will be up to 63 degrees, and our power capability will be about 8,000 watts. And the load will still be on the order of 6500. And on the end of mission day, with the 70 degree Beta angel, which is 100 percent sunlight orgits, power capability is about 9,200 watts. So, as I said yesterday, power is not much of a problem for the time being.

QUERY Phil, on the entry checks, not to be pessimestic or anything like that, but, what are some of the things

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that you look for in that regard, and what are some things that would cause you to maybe think about rescue and things like that?

SHAFFER Well, let's see. If the SPS had failed and two adjacent RCS QUADs had failed, then I don't have a way to get home. I got to go rescue. Okay, Those things are all okay now. You know, we did an EREP trim maneuver with them, with the QUADs early in the mission. They all worked just fine up to the rendezvous, and Sunday, we'll use the QUADs again for the EREP trim maneuver, you know, this is an orbital period adjustment, to keep -

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SPEAKER -- early in the mission. They all worked just fine up until the rendezvous. And Sunday we'll use the quads again for the EREP crew maneuver, you know, this is an orbital period adjustment to keep the ground tracks passing over the same part of the Earth. So, even if tomorrow we thought we had a problem with the RCS, we get a hard check Sunday by using them, to be sure that they're okay. We would have to have a major electrical failure during the checkout. You know, such as loss of all of the descent batteries, and 3 of the entry batteries, or all 5 entry batteries, or both CM RCS rings went down or something. I'm setting you up Art. The check tomorrow is not to find out whether we need a rescue or not. The check tomorrow is to find out what our posture is, find out whether or not we have a G and N control system, and or an SCS control system, to see if we have an SPS control system, and or an RCS control system because Sunday - Saturday, we do an entry simulation, which is a refresher for ourselves and the crew. And we would want to do that with the same configuration that we would intend to do entry day with like if we've got a problem with the G and N, we'd want to pay more attention to the SCS control mode. And if there is a problem with the SPS, we'd want to pay more attention to the RCS propulsion. It's that kind of a thing, it's posture finding.

QUERY Phil, some of those batteries continue to degrade, do they not? And I wonder if you can indicate what kind of degradation you expect during the period when the Skylab is unmanned?

SPEAKER AM or ATM batteries?

QUERY Both. I guess the worst problem is with the ATM batteries.

SPEAKER Yeah, I don't - as opposed to I'm any kind of an expert on that. I don't believe that the ATM batteries are degrading all that much. We have the 4 batteries that just don't have as much capability as the other batteries we have. Okay, they're running about 50 percent. Now what are those 5, 6, 7, and 8? No, 6, 7, 8, and 16 or something. There's 4 of them. Four of the ATM CBRMs that are running about 10 to 12 amp hours, and the nominal was about 20, and they're still doing their thing. There has been some conversation about some of the PCGs, the airlock module EPS not doing very well. But, those batteries when a full charge is on them look just like the rest of the batteries. The only difference in them is they are not accepting the trickle charge, the topping off, at the end of the day side passes. I guess I'd have to say if there's a continuing

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degradation problem with those batteries, I'm kind of blissfully unaware of it. Okay.

QUERY Can you tell us anything yet about a decision on an EVA - the sail?

SPEAKER I'm just as excited and anxious to hear as you are. You look like you'd like to ask me something. Okay.

POA If there are no more questions, we'll let Mr. Shaffer return home or work or wherever you'd like to go.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 14, 1973
9:05 a.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
Jack Riley, PAO

SL-II PC47A/1
Time: 09:05 CDT, 21:14:05 GMT
6/14/73

PAO Good morning. We're ready to start now. Flight Director Neil Hutchinson is here and we'll start off with a summary of his shift.

HUTCHINSON Okay. We had a fairly good evening again last night. The Flight Plan we produced for day 166 is packed. Day 166 as you recall is a day that - you may not recall, but I'll remind you - it's the day the crew gave back to us. It was scheduled to be a day off. Day 166 is the first day of any significant activity for end of mission work. We're beginning to think about coming home believe it or not. And the beginning of day 166 we're going to be doing some entry-minus-7 day checks which are basically on a - workup on the CSM, powering things up - powering up the G&N, powering up the SCS and loading the state vector and doing some drift checks on SCS system and on the platform and it basically sets the CSM up for the ensuing day 167 where we're going to do a thing we call entry simulation, which is basically a crew run through of the CSM work for entry. They don't actually, of course, fire any engines or do anything like that. It's a switch touching exercise plus a procedural exercise plus an exercise for the ground to come up with all the data that's necessary to do the retrofire sequence. It's kind of a tuneup. It's a simulation in orbit is what it boils down to for entry day. We've got another med run scheduled for 166, as we have every day. And a lot of ATM time if you've been paying attention to the solar forecast we finally - here we are getting towards the end of the mission we've finally got a couple of regions on the Sun that are beginning to tune up. Maybe we'll be lucky and catch something. Anyway we've got a lot ATM time, almost 5 hours ATM time in the Flight Plan on day 166. That's kind of a nutshell of the planning. Let me talk about the - talk a little bit about a couple of systems things that went on. The crew got up an hour early this morning, by the way, on their own. They got up at 10:00 they didn't call us until about 11:00. However, we noticed they were stirring around because we saw them open the freezer - that urine chiller draw and a couple of other things that you could tell they were up and stirring around. The ostensive reason was that since they had to go to bed early tonight they wanted to be tired enough to go to sleep so they got up an hour early this morning. So they got their own plan for getting the Circadian thing straight. We have our last EREP pass going today. And since you probably know more about the weather than I do, today I brought the weather. And it's not too swift. I don't - I think we'll do all right on the pass, but it's a long pass. The pass ground track is over 7,000 miles long. It goes all the way down across South America. However, the weather doesn't

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look too swift down there in a lot of places either. But with the instruments that aren't affected by the weather and with the few openings that we have it'll be certainly better than the average EREP pass. We hope we get 16 or 17 sites. Pete, I don't know how many possibles there would have been. That is 16 or 17 sites on the weather that is in existence right now. With the weather that is in existence right now. So I don't know how many would have been possible had we had good weather. I would suspect probably 25 or 30 if the weather would have been really spiffy. But I don't know. I haven't got that data. Believe it or not, the M512 furnace facility is working again this morning, nominally so far. And CDR got up and immediately went to work on the M553 and he has finished melting the spheres on the wheel that was in there and the second and last wheel is in the facility and he is working on those now and the gun is functioning normally. The only anomaly we seem to have in there this morning is that the spheres are not melting. It's very difficult to aim that gun at the right place on the sphere, and as you know the spheres have a little trigger mechanism when they're melted that allows them to separate and it appears that a couple of them - or several of them, in fact, have separated before they're totally homogeneously melted. And we passed up some advice to try and aim the gun a little higher on the sphere to get it away from this trigger mechanism that retracts the spring and let's the thing go. However, the big news is, of course, that the gun is working again, properly, and we're not having to - it's cutting off like it should and so on and we're not having to leave it on continually and run the wheel manually. We do have a procedure on board in case it hangs up again or we have one on the ground which we're going to try and that's a slight tapping on the box that has the relay in it that we now think is the one that's hanging up that causes the gun to hang on continuously. Anyway 553's - go pressing on and we get it finished we'll go on to 552. Another anomaly - let's see since I have been here last and I don't know how much you heard about it last night - it is an anomaly but - you remember yesterday we ran both the CSM coolant loops all day long. And last night, lo and behold, over a ground station we had our old 17 amp glitch, if you will, it's not a glitch but 17 amp unexplained load on CSM MAIN A BUS. And after some quick looking around we have discovered that we apparently have a shorted power - shorted switch on the secondary radiator coolant heater, secondary radiator loop heater, and secondary coolant loop radiator heater - I'll get it right yet. And it appears that even though we're flying with that switch in OFF, the RAD heaters in the secondary coolant loop in the CSM are coming on. And you'll recall early in the mission -

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HUTCHINSON And it appears that - that even though we were flying with that switch in OFF, the RAD heaters in the secondary coolant loop in the CSM are coming on. And you'll recall early in the mission, the first night we were docked I think, we had a MAIN A undervolts, and we have since gone back and chased that one to ground and discovered that indeed that was caused by this secondary loop RAD heater which we thought we had OFF. The switch was off and apparently we still have electricity down there and when the loop cues it to come on, it comes on. Now we - last night before they went to bed to preclude any MAIN A undervolts situation occuring, we turned the loop off - secondary loop off again. And we got the data we needed. We were going to leave it run until this morning but we had already - it had be on about 7 and a half hours, so they got the data they needed about how - what kind of effect it would have in warming up the primary loop. And so that's a new anomaly that we've discovered in the CSM. It's of really of not consequence. We could end up - when the loop - secondary loop is off, the heater doesn't cycle on because the loop stabilizes the temperatures high enough to not trip the RAD heater. That's about all I have. We had a little (garble) working on - that we've been working on in the workshop on the water tank pressure down in the waste management compartment and that thing's kind of in limbo. I'm not sure what we're going to end up doing about that. It's not a - it's not a problem, it's just something we don't understand, and we're trying to understand it. And I don't think we - we have it all in tow yet, but it appears that the pressure out of the water tank 7 is several PSI. Several, maybe 10 or so below the - what it ought to be. And we still don't understand that. And we did some work with that this morning with not any conclusive results yet.

PAO Bruce.

QUERY Neil, what time is or was the fuel cells shut down on them.

HUTCHINSON It is today. I can tell you exactly what time it is. It'll occur probably about - I would guess, around between 18:20 and 18:30 if they stay on the flight plan. Zulu today. Right after lunch.

QUERY And the the entry sim Saturday, how long does that last? And this is the first time we've done anything like this, isn't it?

HUTCHINSON Yes, it is.

QUERY Of it's kind.

HUTCHINSON It lasts about all morning. Basically it's about - about as long as the entry sequence. It's - we've got

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...let me just figure it out here. It's about 5 hours long, 5-1/2 hours long. Which is about, if you'll recall, that's about the total time - I'm not exactly - I got to get - get back tuned up on it cause it's been a while since I've looked at it. Tomorrow I'll be able to tell you quite a bit about it because we would have flight planned it and I'll have some more - I'll have looked at it fairly carefully. But right now I'm reading that data off the - off the 7-day forecast and the nominal time from - from undocking to splashdown is somewhere in the order of 5 hours. So we're pretty much running that whole sequence. And of course, the crew may not be totally involved the entire time but the timeline has to be spread out like that so the ground can compute all the numbers in the right time frame.

PAO Pete.

QUERY This simulation you said it just means touching switches, but does it - does it mean doing some guidance navigation systems - -

HUTCHINSON Oh, yes.

QUERY ...actual checks, right?

HUTCHINSON Oh, ye - not checks. It - they'll be doing all the - -

QUERY Activating the system to - you know - -

HUTCHINSON And we'll be putting state vectors in it and so on and so forth. Yes. I was really referring to switch touching when - when it came to propulsion systems.

QUERY This CSM coolant radiator loop thing doesn't affect the spacecraft temperat.res at all?

HUTCHINSON No. Pete, the reason we did that - they're doing some data gathering. You recall way back about - must have been 3 weeks ago, we ended up having to turn on a couple of more loads in the CSM. One load in particular, we turned on an inverter and we left it on, and it's been on all - all this time for heat purposes because we couldn't keep the primary radiator warm enough. We were afraid the primary RAD was getting too cold, and this was a little test. One of the theories, and the theory apparently from what I can gather was correct, was that if we turn on the secondary loop in addition to the primary loop, with the secondary loop radiators around on the sunside we'd actually end up introducing some heat into the primary loop which very well might keep it up for a cheaper price than we - equipment we brought on to - and I'm not totally clear on the - the test results, but I understand that indeed the loop did warm up some. But that's all it was. It was just a guess - a data gathering exercise. It has nothing to do with the entry simulation per se.

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QUERY Have you heard anything further about an EV - about the EVA? Any additional tasks or any additional inputs and stuff?

HUTCHINSON Not a word (garble) We're still looking at the CBRM thing. That thing is in work at Huntsville intensely as to making sure that that's the right thing we want to do. And if we do it they're doing a lot of - a lot of actual testing with string gauges hung around things and tapping on things and seeing where the vibrations all go and so on and so forth. So that question is still not settled. And of course, the management counsel is meeting - Today is Thursday, today. Is that right?

PAO Yes, it's an all - day meeting today.

HUTCHINSON And I - tomorrow I'm sure that we'll know exactly what we're going to do with the sunshield. Now the crew did report yesterday, as you probably have noted, that the parasol appears not to be degrading in color hardly at all. It was reported, I believe, as orange - orange.

QUERY Well, what do you think they tapped that cell with? One of those - taking a rod up with them or are they going to have something - -

HUTCHINSON No, they have a hammer, a small, very small hammer that's in one of the tool kits, is the thing they're talking about using. I did look at the configuration of the thing last night. I was right, there are six of those - I don't know if you've seen one, there's six of them on a panel and it's the one up on the top right hand corner; CBRM 15 is. And they're each CBRM - although they're mounted on a common mounting place - Each CBRM is in a box by itself if you will, about like this. And there are a lot of considerations to wanting to do that, that people are looking at. For example, our friendly rate gyros are one rack over from this thing they want to tap on.

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HUTCHINSON No. No. But they're looking at things like if you tap on this, what kind of vibrations are you getting other places on that truss and outside of the CBRM area? So I don't really have a lot of new data on the EVA, and I think - see, we're pretty much homing in on it here. I mean, you know, we're only 3 days away; so we're going to be - 4 days - we're going to be getting with it here.

PAO Okay, we apparently have no call-in questions from our far flung listeners; so we'll adjourn.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 13, 1973
6:29 p.m. CDT

Participants:

Phillip C. Shaffer, Flight Director
F. Dennis Williams, PAO

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PAO Okay, we'll get the news briefing underway, and before we start I'd like to announce that revision C of the flight plan is being printed in the newsroom and will be ready immediately after the news briefing. Our briefer today is Flight Director, Phil Shaffer, and I'll turn it over to him now. Phil?

SHAFFER Okay, I assume you guys had a copy of the flight plan. You got a copy yesterday of what we're going to do today. And we accomplished all of those things that were scheduled with the exception of the block in that flight plan that said 5 - M551 terminate, which was the welding experiment, and we substituted in its place M553 which is this sphere forming experiment. And if you remember, yesterday, I suppose they talked about it on the Change-of-shift briefing. The 551 was having some problems and between the crew and ourselves today we've exercised some test functions on the thing and it appeared to be working just fine. So we committed to the 553 run. We did not get it totally complete. The electron beam gun which we apparently couldn't turn off yesterday went off today four-fifths of the way through the experiment. And we have not had time today to troubleshoot that, so we don't know exactly what happened. Other than that the EREP pass was done very well. The ATM passes were done very well. The CALROC was launched today and had a completely successful launch and we did joint observing program 12 B as planned, which is done in association with the CALROC. You know the CALROC is launched for - to calibrate the data that the ATM is retrieving. We had two M131 runs today plus the M092, 171. The crew finished all of those well ahead of schedule. Those guys are really learning how to do those things and are whipping through and giving themselves some spare time. The flight plan for tomorrow is the last EREP pass for Skylab 2. It has an exercise called EREP CAL on the end of it which is functionally the same thing as the CALROC was today. It's a calibration exercise with the EREP instruments where the Moon is viewed with the EREP instruments. And since the Moon is a known light source then we'll be able to calibrate - help calibrate the data that we have gathered during the EREP passes. Medical experiments are scheduled tomorrow as usual. The M092, 171, and ATM activity. And then we will start into what really culminates in the end of the Skylab 2 mission. Tomorrow we intend to shut down the fuel cells. They will be about depleted of the cryogenics supply. When we do that we have to transfer the power source to the workshop and we'll be drawing power from the airlock and ATM's power supplies. Later on in the evening tomorrow we will reconfigure the command module - command

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service module to get it back to the configuration that it would have been had we not had problems with the electrical power supply. And we'll sit once at duty for awhile. Friday we'll do the guidance and control and propulsion system checks on the CSM. That's about a four-hour exercise where we power all that up and check it out and sort of get a handle on what we're going to have for us. Saturday we'll do a full blown increased SIM, which doesn't really power the CSM up, but it goes through all the timelines, the air-to-ground, the crew goes through the checklist, refamiliarizes themselves with where all the switches are and we read the maneuvers to them and it's a dress rehearsal for the end of the mission. One other thing I might add that we did today. We powered-up the other coolant loop in the CSM and we did not do this be-cause we have a problem with the CSM. We did this to gather engineering thermal data that is intended to help us thermally configure the Skylab 3 and 4 CSMs for the environment up tthere. And when I say thermally configure them that means we may want to change the paint pattern in some of the places that have been running a little hot or a little cool. The - that activity was performed with no problems. We did one little extra step in drawing some water - potable water out of the system in an attempt to calibrate the thermal models here on the ground that are used in this thermal analysis. The thermal model was predicting that the water lines just outside the water tanks which are close to where the glycol loops come in from the radiators would be frozen, but it was somewhat marginally - so we tried to draw some water and lo and behold we got some water. So the lines are not frozen. I think that's about a summary of - -

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SPEAKER - originally, so we've tried to draw some water, and lo and behold, we got some water, so the lines are not frozen. I think that's about a summary of what we did today. Questions.

QUERY What time will the fuel cells shut down B. And can you detail the procedure that the crew will go through in doing that.

SPEAKER Oh, I wish I'd have known you were going to ask that question. The block of time that begins that activity is at about 18:10 Zulu. Okay, in shuting down the fuel cells, it really consists of only a couple of big steps. About an hour and a half or so before we shut them down, we do a hydrogen purge of the fuel cells, to clean them out, then we close the reactance valves, the cryo valves that are feeding the hydrogen and oxygen to them. And when you close the valves, they're done. The power transfer, if you'll remember when we first got there, we hooked up both the power umbilical and the COMM umbilical between the CSM and the workshop, you know, our air to ground COMM comes through the CSM, our voice COMM. That cable if you will, power cable is hooked up. The biggest thing that remains to complete the power transfer is to close some breakers, circuit breakers that complete the circuit between the OWS power supplies and that umbilical, and to connect the battery buses. Not the battery buses, the main buses in the CSM to that umbilical. Okay, and then one further step and that's to readjust the load sharing between the AM and the ATM power supplies so that they're equalized again, in terms of providing that CSM power. The CSM power requirements, by the way, will be a little bit higher than they are now, as a result of going back to what we call our prelaunch normal quiescent configuration.

QUERY Do you know how many watts -

SPEAKER I'd guess 100. I think the difference between where we are now and where we'll be after the exercise tomorrow runs somewhere between 90 and 100. It's not very much.

QUERY That's what Skylab will be giving to the CSM.

SPEAKER No, no, no, that's the Delta configuration, we'll probably be pumping 1100 watts steady state, across that umbilical, on that order. I think we're running about 900 or 1,000 now. So somewhere in that neighborhood, and we'll jump it up on the order of 100.

QUERY Is that all coming out of the - off the solar wing?

SPEAKER Yes, it comes out of the solar wings on

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the ATM and their - and the OWS SAS wing, you know, and those systems are all hooked together, you know, and it's like a common power supply. It's all balanced throughout. I'm sure the guys have told you about the REG buses where they're hooked together, and the way we adjust the voltage levels to create the power loading, and all of that then is fed through the umbilical to the CSM.

QUERY This may have been covered. I got in a little late, but how do you plan make up the 1100 watts as far as the spacecraft operations systems.

SPEAKER Well, we're doing real well on power now. As long as we don't do an EREP. Okay, and one of the reasons we're doing real well on power now is because the Beta angle is getting higher, significantly higher, as a matter of fact, and we're spending less and less time in the dark. And you know the Beta angle at the end of mission, on day 29 is 70 degrees. And the magic with that number is that the spacecraft never goes into darkness. The orbits 100 percent sunlight. So we really have quite a bit of power, and the last EREP pass is tomorrow. So the combination of no more EREP passes plus the high Beta angle is giving us the power that's required to feed the CSM.

QUERY Are you saying in effect then, that there shouldn't be any drawdown in any of the systems, for example, to get a baseline you've got now, what, about 6500 - 7000 watts -

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QUERY - make any - draw down on any of the systems - for example, to get a baseline you've got now - what, about 6500 to 7000 watts? What kind of a budget are you working with now?

SHAFFER I can't answer that.

QUERY Okay.

SHAFFER Let me tell you something you probably don't know. Chuck Lewis is the bronze Flight Director. Chuck Lewis's house is full of water. I took his shift today.

QUERY Well, maybe you could answer this then. What will these increasing beta angles give you as regards to power? What will you be at the end of day 29. What are you looking at in the way of power?

SHAFFER Some old numbers. I think our baseline was probably running around 7000, you know, steady state. We - before - in the very low beta numbers, and that ratio is 58 minutes of Sunlight to about 36 minutes of darkness. Okay, and I've got a feeling you can just about add 50 percent to the budget. But we really need to get one of the electrical guys in EGIL to answer that question. But the power from this point on - in a configuration we're in now just isn't the problem.

QUERY Yeah, what you're saying in effect is, the beta angle will be increasing fast and (garble)

SHAFFER Good and hard plane going up, that's right.

SHAFFER That's exactly right.

QUERY You'll stay ahead of the curve all of the time.

PAO I believe this - someone had a question.

QUERY What time and who will be attending the meeting tomorrow on whether you will deploy the sun - the sail?

SHAFFER You're not going to believe this. I didn't even know there was a meeting tomorrow. Okay? One of the things that's kind of curious that doesn't leap right up and grab you is - is why we're shutting down the fuel cells tomorrow instead of just letting them run out. And for all practical purposes they have run out. When we shut them down tomorrow they - at some point - the quantities get so low that they don't produce enough pressure to provide the consumable that we want to them. We may not have gone to the absolute minimum that we could go with but when you start out without a power problem and you know you've got to do it today, you know you're going to go through the absolute minimum before day 166. Then you start hunting for a convenient place in the flight plan to power them down. Now, there's no question that we'd be past the minimums by the time the crew got up on day 166, so we have found a convenient place about - like I say between 18:10 and 18:40 we shut them down tomorrow in the

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flight plan. If we had a day or two days or three days left, you know, then it would be a very good question. But when it's a matter of three hours, because that's where we are, you know, without activities going on the crew goes to bed, or starts their pre-sleep that day just about 22:00 and we've finished the power transfer and shutdown about 18:40, so we're beating ourselves out of four hours of fuel cell power when we don't have a problem. There's an operational reason for doing that too, earlier than that. You want to watch that system perform after you've done that power transfer and understand where you are before you put the crew to bed.

QUERY Do you have any idea when the decision on the - whether or not the sunshield - sunshade will be deployed - the sail? When a decision might come?

SHAFFER If you say there's a meeting tomorrow I'll bet you it's going to come tomorrow. If, you know, it's the purpose of the meeting. Now, one of the things - let me say that - the pre-launch analysis showed that the parasol - the material of the parasol would degrade rather rapidly. Okay? That was due to the effect of the Sun on the nylon. Okay? Part of the problem with that was, it wasn't a real Sun. It was a simulated Sun. And part of the analysis was analytic rather than tests and the performance of the sail to date displaying the characteristics and degradation just isn't happening. The - one of the numbers I heard, and by no means would I treat it as a final formal number, because it was a number that was passed out in one of the meetings - in the review meetings, and was preliminary then, was that the nylon in the sail would have lost on the order of 50 percent of its break strength after 100 hours of Sun. This was the simulated Sun. And in addition to that, the orange color of the parasol would have faded through - -

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SPEAKER This was the simulated Sun. And in addition to that the orange color of the parasol would have faded through yellow and would be in the white on it's way to tan, and then brown. Joe and Pete both looked at the parasail today, and it is Florida orange, orange, so it - we're not seeing the symptoms of the degradation that we thought might occur before launch, and I'm sure that's going to feed into any decision to erect any other sunshade that would be under consideration.

PAO Do we have any other questions? I want to thank you gentlemen. We'll let Phil get home and get some needed rest.

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SKYLAB NEWS CENTER
Houston, Texas

Medical Experiments Review
Johnson Space Center
June 13, 1973
3:05 p.m. CDT

Participants:

Dr. W. Royce Hawkins, Deputy Director Life Sciences, JSC
Dr. Paul Rambaut, Principal Coordinating Scientist, MO-70 Series
Dr. Gerald Homick, Principal Coordinating Scientist, M130 Series
Bob Gordon, PAO

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PAO Okay, ladies and gentlemen. We have with us, immediately on my right, Dr. Paul Rambaut, Dr. Royce Hawkins, and Dr. Jerry Homick, H-o-m-i-c-k. Dr. Hawkins, you want to start?

HAWKINS Okay, Bob. I have these two gentlemen with me today to talk about two additional areas of our medical experiments Remember last week we had Dr. Johnson and Mr. Michel over to talk about the M092 and 171 studies. Dr. Rambaut is the Principal Coordinating Scientist now for the M070 series, the food nutrition mineral balance. And Dr. Jerry Homick is our Principal Coordinating Scientist for the M131, the grouper experiments, the vestibular studies. Now to - Before I turn it over to them, to bring you up to date with where we are with food and vestibular wise, I'd like to just try to recap on the other areas. Now with the M092, we will run the Science Pilot today, which, if my memory serves me right, that'll make the fourth run with Joe Kerwin. And we will have had at the end of today, then four runs each, with all three crewmen. Now we first saw a breakaway point in the third level of the M092 study with Joe about 2 months ago, in which we did see, you will recall, the drop in blood pressure, which indicated that he had reached a level. And we therefore had to terminate the run. And we, therefore, reduced the maximum negative pressure stress that he would see for the balance of the study for the mission. We then saw the same thing again with Paul Weitz, run before last. Or - yes, run before last. Dr. Kerwin, in monitoring him, felt that he was again approaching a point where he would note a significant drop in blood pressure, and therefore terminated the run at 3 minutes and 45 seconds into the stress test. Now - So, those two crewmen are now working at a minus 30, minus 40, minus 40 stress levels. The Commander, Pete Conrad, let's see we ran Pete Conrad yesterday. He was able to complete the entire run. We do not have all of the data back in our hands to completely analyze that, to know exactly what the maximum blood pressures were and maximum heart rates were. But he was able to complete it without any ill effects. 171, the - All three crewmen have been doing very well with the M171 series. Since we have gotten over the initial thermal stress and heavy workloads of the initial phase of the experiment, the the ah - All three crewmen are now right in their baseline measurements as far as heart rates and blood pressures go. And we are really not seing any significant deviation from what their measurements were preflight. So that their work performance capability, exercise response, oxygen utilization, minute volume and all look very, very nominal as far as we've seen thus far. Okay. The other experiment would be the M133,

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the sleep. And this has gone, I think, very well and I think we are beginning to see some very interesting results there. The analysis of this data is very slow. It's on a one to one basis and it takes a long time, of course, to go back and analyze five, six, seven, or eight hours of sleep. So we are running a little bit behind on that. But so far it looks like the crews are sleeping - they are moving into a sleep period with less latency than what they did preflight. They are - -

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SPEAKER - were sleeping. They are moving into a sleep period with less latency than what they did preflight. They are showing again rim sleep which is important and also they are sleeping in the fourth stage - a deeper stage of sleep for longer periods than they did in the preflight period. Now, just what all this really means yet is still up to Dr. Frost who is the prinicipal investigator on this study. And I don't think he's really ready to say exactly what this does mean to us. All right now I'd like to - if I may, turn it over to Dr. Rambaut.

RAMBAUT Well, as Dr. Hawkins pointed out my particular area of interest is the M070 experiments which concern nutrition in the spacecraft and musculoskeletal function, what's happening to the bones and muscles. Of course as you recall the concern for this area arose first in the Gemini program where various studies that we carried out showed that were losses in the density of the bones and in the chemicals which constitute bone and muscle. We observed this in Gemini, the Russians have seen it, we saw it again in some studies in Apollo, particularly on Apollo 17. In planning for the Skylab program we really decided to mount a very definitive, comprehensive experiment to look at how the human reacts in prolonged weightless light, as far as his bones and muscles are concerned and as far as general nutritional intake is concerned. The M070 experiment is conducted by simply measuring everything which goes into the man and everything which goes out. This study is begun about - well in the case of SL 2 it was begun 30 days prior to the - prior to launch, where the crew was put on, essentially their flight diet, and all metabolic excreta were collected. The study has continued pretty well uninterrupted into flight, continue throughout the flight and will go on until 18 days postflight. The study involves - has a drastic effect on the design of the food system and on the analyses that we have to perform on the various foods the crew eats. And it has had an effect on the design of the waste management system - the system that collects urine and feces. The other aspects of the experiment is that blood chemistries are taken prior to flight, inflight and postflight. Body weights are measured, body volumes are measured preflight and postflight and those in essence constitute the experiment - experimental parameters. Oh, bone density is also measured - you have a look at the bone with an X-ray - with a gamma-ray emitting device and see what the density of the bone is before the guys go up into flight and when they come back. As far as results are concerned, during the preflight period, the crew consumed essentially thheir nominal food - they ate everything that we provided to them. And we

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were able to stabilize this crew on this metabolic intake about 20 days or so before launch so that everything that he was taking in essentially equaled what was coming out. We weren't building up pools of calcium or potassium or nitrogen. Things were stable at approximately two weeks prior to launch. You remember that inflight a lot of the results of this experiment are going to depend on postflight analysis of urine samples and of fecal samples and of blood samples which are returned from the spacecraft, so we can't talk about those analyses until post-recovery. What we can tell you about now is the nutrient intake inflight, which we know precisely and urine output, which we know fairly precisely and water intake. The amazing thing about Skylab has been that the food intakes have been very high. They've been higher than anything we've ever seen before on Apollo, and Gemini and other MG and USSR missions. The intakes inflight have been about two to 300 kilocalories per day less than what they were on the ground and this was about what was anticipated prior to flight. But the cost of activity in weightless light would be less by about 2 to 300 kilocalories a day. By looking at the inflight body weights, which is another piece of information we get back from the spacecraft, weight doesn't seem to be changing. Or if it is changing, it's changing very, very, slowly, which means that the caloric intake inflight is about what the crew needs. They're not getting too little and they're managing to sustain weight on this intake. Going along with these very high nutrient intakes you can - you also know that automatically the crew is also getting all the vitamins and - -

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SPEAKER - going along with these very high nutrient intakes, you also know that automatically the crew is also getting all the vitamins and calcium - all the essential minerals that they need. They're intaking the various minerals, constituents of the bones and muscles at exactly the levels within tolerances that were set prior to flight. If for instance, we specified that 800 milligrams a day of calcium should be taken in by each fellow in flight, that is in fact what the intake is, within a tolerance. The crew, as far as we know, from weight data and from intake data is at this point in a state of excellent nutrition. The urine collection has revealed that urine outputs are - the difference between urine outputs and water intake, which really is insensible, water losses from respiration and from sweat, were fairly high at the beginning of the mission, which means that a lot of water was lost through routes other than urine loss, which you would expect in the hot atmosphere of the spacecraft. As far as water balance is concerned, though, from the intake and output measurements we've got right now, we expect that a state of stability has been reached. Some comments on the collection equipment, for this urine and feces in flight, of course, you know collecting urine and fecal material in weightless flight is an awfully difficult thing to do. The comments on these bits of equipment, which really took mammoth design efforts over the last few years have been excellent from the crew - the urine system is working very well, and fecal collection. Cooperation from the crew inflight has been outstanding. This experiment is probably - probably makes more demands on the crew, on their mode of life from hour to hour than any other. The cooperation has been excellent. The crew has been complying with all the estimates necessary to make - with all the requirements necessary to make estimates of food intake and water intake, and all the requirements to undertake complete collection of their excreta. It's been a very cooperative crew.

PAO Does anyone have any specific question they'd like to ask at this point?

QUERY Wasn't there a problem with air in the urine bags at one time?

SPEAKER Yes, in the first few days of the mission there was air in the sample bags. And of course, you remember at that time, the urine samples were taken without benefit of orbital workshop urine collection system, which itself has a centrifuge to get rid of that air, which means that the urine samples from the first, second maybe through the fourth day of the flight contained air and urine, which means that the urine samples that would be returned to us for analysis would contain somewhat less urine than what we'd hoped. How much there's no way of estimating.

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QUERY Has that been solved now, that is no longer a problem?

SPEAKER Yes, correct. When they used the centrifuge device which is in the workshop, the air which is used to carry urine from the man to the reception device is separated out, is bled off and urine is collected with very much less air. Of course, there still always is some air, but much less.

PAO Paul, do you have a question back there?

QUERY With the cardiovascular deconditioning, which apparently has occurred, isn't this going to have an affect on renal activity, and as a result are you going to have less urine output? Do you expect this to occur as deconditioning continues?

SPEAKER This may well happen. The device that we're using to monitor urine volume in flight right now, is probably not sufficiently sensitive to pick up small differences in urine output. However, urine output on the ground, when we get those samples from the spacecraft back, we've got a very much more accurate way of estimating exactly what that urine volume was. There's actually a trace of compound in the urine bag which gets dissolved in the urine and a bit of that goes into the sample bag and we analyze for the trace on the ground and get a very good idea of exactly what the urine volume was. And we may well see a difference, because of the reasons you stated.

QUERY You said that the urine output has reached a state of stability on the input and output of liquids. Would this state of stability indicate that there's been any dehydration whatsoever, what would be typical on the ground?

SPEAKER I would think not. Mainly because there's - the weights seem not to be changing. When I said a state of stability, I meant the difference between water in and water out, from day to day seems now to be about the same. Whereas at the beginning of the flight, it was quite high, and it decreased to what's more or less a constant amount now.

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SPEAKER - what out from day to day, seems not to be about the same. Whereas at the beginning of the flight, it was quite high and it decreased to more or less a constant amount now, and with these very high calorie intakes you wouldn't expect - well and no weight losses I don't think body composition has changed.

SPEAKER Okay, we've said a lot about nutrition and cardio-vascular problems and all -

QUERY Nobody, within my hearing anyway, mentioned anything about traumas, and they're up there turning cartwheels and flips and etc., have there been any scrapes or breaks or marks or anything like that?

SPEAKER No, I really don't think there have been. We certainly have not gotten any reports on it, and to my knowledge there have not been any injuries, not even a scrape.

PAO We have a question submitted to us - Dr. Hawkins - I guess to Dr. Rambant from Arthur hill. Will Conrad's fondness for butter cookies deplete the supply so that more will have to be taken on SL 3 and SL 4?

SPEAKER At Conrad's current rate of consumption, no. You remember that butter cookies are being consumed to increase the caloric level of the predesigned menu. And his consumption rate I don't think will increase very much beyond what it is now. Two maybe 300 kilocalories. There are plenty of butter cookies on board.

QUERY Perhaps you went over this before I came in but you expect this cardio-vascular deconditioning just to continue, or is that still your unknown or you got any new data on it from last night or -

SPEAKER Well no, really we don't know yet. We still have two or three more runs to make. We're still seeing change. Let me put it that way and I think as long as you're still seeing some change there you definitely expect this trend to continue. Now, whether we're right at the plateau level here or not I'm just not sure yet.

PAO We got one here and then down to Abbie.

QUERY Is there a point, maybe not on this mission, but on the SL 3 and 4 where this deconditioning, is it possible that it could become dangerous to their readjustments and so forth.

SPEAKER Well, yeah, if it continued to develop yes, it could become very, very significant to what your body would be able to stand during any excessive loading such as reentry. I might, while we're on this particular subject, let me clarify a point, which I think, might have been misunderstood yesterday evening at the change of shift briefing. I was quoted anyway as saying that there were irregular heartbeats with - by the crewman Paul Weitz the day before. I certainly didn't mean to state that, if it did really come out like that, but what I did say was, that we had seen the change in heart rates, and the drop in his bloodpressure, which was similar to what we had seen with Kerwin, but we had not seen any premature beats, ectopic beats or any arrhythmias of the type which we saw with Pete Conrad on his first run.

QUERY Do you want to take any more questions now?

SPEAKER Well, I'd like to go ahead and move in if we - you haven't had a chance. Why don't we -

QUERY That's okay, I'll wait.

PAO All right. Let's introduce Dr. Homick in a new area here. I think which has a lot of interest, really.

HOMICK I think that by now most of you are pretty familiar with the objectives of the M131 experiment, the human vestibular function experiment. I'll take just a few moments to quickly go over the types of measurements we are making in flight on each of the crewmen. One of the measurements we're making is a measurement of the absolute sensitivity of the semi-circular canals. That part of the vestibular system which responds to angular accelerations. We are making these measurements by means of the oculogynic illusion or OGI for short, as we call it, and during this test, the subject sits in a chair and has a goggle placed before eyes which contains a visual target. He is accelerated at some value --

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SPEAKER During this test the subject sits in a chair and has a goggle placed before his eyes which contains a visual target. He is accelerated at some value and reports whether or not he can perceive apparent movement of that stationary visual target. That apparent movement is the oculogyral illusion and depending upon whether or not the magnitude of angular acceleration imparted by the chair exceeds the response threshold of the semicircular canal, he will or will not receive the illusion. A second measurement that we are making is one of susceptibility to motion sickness. During this test, the crewman sits in a rotating chair, is rotated at some prescribed velocity, during that rotation he performs head movements. They have been trained to recognize a number of different types of symptoms commonly associated with motion sickness and to identify different levels of severity of each of those symptoms. As those symptoms occur, they are recorded, and when a very low level of motion sickness is reached, the test is terminated. The final set of measurements we are making deals with spatial orientation. And here we are using the goggle device again, which contains this visual target. The target can be adjusted both in the pitch and roll planes, and we go through a series of measurements here with the crewman in different positions relative to the spacecraft - either with his body parallel with the spacecraft, longitudinal axes at some angle to the - or at some angle to the axes of the spacecraft. And he's required to make settings with this goggle device as well as a pointer device - a hand-held rod which has a pitch and roll readout indicator on it. Now, going back to the oculogyral illusion. Thus far we've had three complete inflight runs on the PLT and the SPT. The third run on each of these crewmen was completed just today. As a matter of fact, the last one about an hour ago, so I have data from only the first two runs. That data is pretty complete now and what we have seen thus far indicates that the Pilot's threshold for perception of the oculogyral illusion appears to have shifted upwards just a little bit. In other words, it appears from the data, the limited data that we've seen this far, that he is requiring a slightly greater amount of angular acceleration - a slightly greater magnitude of stimulation acting on the semicircular canals in order to perceive the illusion. The data with the Scientist Pilot is not as clear cut in this regard. If anything, there appears to be a little bit more variability in his responding. There is no clear upward or downward threshold shift apparent, but we're seeing a little bit more randomness in his responses. After we have today's run back - the data back from that one, plus the final run that we'll have on the OGI next week, hopefully some trends

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will begin to appear which will make a little bit more sense to us. Now, with regard to the motion sensitivity tests - that is the measurement of susceptibility to motion sickness. Let me go back just a little ways and explain what we did preflight with these fellows. For each of them we established an optimal velocity or chair RPM to be used inflight. In other words, depending upon persons - individual susceptibility to motion sickness - we kind of custom-fit a chair RPM for that person so that inflight we wouldn't stress them too hard the first time, or stress them not enough. As a matter of fact, the first inflight measurement we were very conservative and protocol dictated that we not rotate the chair at all. It was at zero-RPM. During the first inflight test on both the SPT and the PLT at zero-RPM, they each performed 150 head movements, which is the limit that we've set, without any symptoms occurring. This was not real surprising to us because certainly on the ground in a one-g environment, one should be able to make head movements all day long and not become motion sick. Although we thought perhaps in zero-g symptoms might appear with head movements set at zero-RPM. And this of course was based upon some of the Mercury, Gemini, and Apollo results where some of the crewmen reported inflight motion sickness. Nothing occurred that first time around at zero-RPM, so at the next scheduled inflight test each of the crewmen was run at his pre-selected chair RPM, or rotational velocity. For - -

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SPEAKER - run at his pre-selected chair RPM or rotational velocity. For Weitz, that velocity was 15 RPM, for Kerwin, it was 12-1/2 RPM. We were a bit surprised to see that neither of the crewmen developed any symptoms during the entire test protocol. In other words, they both went 150 head movements with no symptoms. This indicated pretty remarkable shift in their susceptibility to motion sickness. In other words, they just weren't as prone to motion sickness at that chair RPM in weightlessness as they had been on the ground. We discussed this with the PI's and they recommended that we increase the chair velocity for the next test. In other words, to stress them a bit more and see whether or not we might get at their threshold and illicit some symptoms. So, for Weitz, the chair RPM was increased to 25 RPM and to - for Kerwin, it was increased to 20 RPM, and they were both run earlier today at these velocities and neither of the crewmen reached the M-2A level of motion sickness, or that mild level of motion sickness that we've identified as our cut-off point. So, in other words, their threshold for susceptibility to motion sickness has even changed more than perhaps we'd thought it had. We don't know for sure yet whether or not on their last test, which will be sometime next week, whether or not we'll increase the chair velocity even higher. We're going to have to take a closer look at the data from today. But with regard to susceptibility to motion sickness, I think it's fair to conclude even with the limited data we've received thus far that there's been a pretty substantial change. The spatial localization measurements, we have had two inflight runs thus far on each of the crewmen. Only one on the Commander, two on the SPT, and two on the PLT, and have received data from only the first of those runs. It turns out it was fairly time consuming for the crew to voice down all of the data from those experiments. There are literally hundreds of numbers that they would have to voice down to get us complete data from a run, so we agreed that they would return that data in their logs postflight. So, on the basis of that one run that we have seen actual data for on each crewmen, it does appear that there was a very minimal change in their pitch and roll settings in several of the experiment modes relative to baseline. But it's much too early to say whether or not those changes are just within the noise level, or whether or not they do represent a little bit of a change in their spatial orientation ability in the manner in which we're measuring it. I might point out that there have been no problems with the experiment hardware. It's been functioning beautifully. A very minor - well I don't know how minor, but the crew reported a little bit of a problem with the seatbelt

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that holds them into the chair, and we sent up a fix on that a few days ago, and we assume they're using it.

PAO Okay, thank you, Jerry.

PAO Are you happy, or do you have any questions?

QUERY Could you give any reason why they seem to be so nonsusceptible to motion sickness?

SPEAKER Well, I don't think I have the final answer - or maybe no one has the final answer yet, but it appears that the otolith organs which are the other portion of the vestibular system may have a lot to do with motion sickness, perhaps more than we had heretofore thought, and that in zero gravity where the otoliths are effectively freed from any stimulation - their primary stimulus is gravity. Where they're freed of any stimulus their influence on the semicircular canels is now changed. The canals are now, perhaps, free to respond in a different manner, and with these two crewmen, at least, it looks as if the canals are not responding as - or at least the output, you might say, from the canals, the neuro-output, or rate of response may be changed, or it may be something that is more central in nature. That is, you know, central nervous system processes - it may be more at work here.

PAO Mr. Reeser.

QUERY Doctor, though, isn't motion sickness a highly individual thing? I mean, you can't - from these two men you can't project - -

SPEAKER That's correct and I - if some of you were here maybe a month ago, prior to the SL 2 launch, I think I said then that it's quite difficult to predict on the basis of our present knowledge how a given individual is going to respond to weightlessness in terms of motion sickness. Studies done at Pensacola and elsewhere have indicated that during zero-g parabolic flights, for example, people tend to fall into two categories, those who become more susceptible - -

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SPEAKER - during zero G parabolic flights, for example, people tend to fall into two categories, those who become more susceptible to motion sickeness and weightlessness and those who become less susceptible. It could simply be that we have two crewmen here who fit into that latter category. They're becoming less susceptible. This doesn't mean that the same thing would happen for the next two crewmen or the subsequent (garble).

QUERY Have two subjects on each flight, and does this make you wish you could try all three of them?

SPEAKER Yes, it does. When we're limited to so few people to begin with, and because these responses we know show a lot of individual variability, the more subjects one can test, the better, but for, you know, reasons that I'd rather not go into, the Commander was deleted from the motion sensitivity portion of this experiment. This was something that was decided years ago. So we are testing just the SPT and the PLT on the three Skylab flights.

QUERY You have commented that you were surprised that you saw no evidence of motion sickness in any of the men, just from their activities and their comments and so forth that leads you to believe that maybe Pete Conrad would have been - would have reacted somewhat similarly to the rest of the crew?

SPEAKER Well, if simply on a basis of attempting to correlate their subjective reports, I suspect that if we were testing Pete in the same fashion, we'd be seeing the same changes in him. I think he's been engaged in as much physical activity where head movement and body motion is involved, and has had as many chances to become motion sick and hasn't. Therefore, I tend to believe that his threshold has increased pretty much the same way the other two crewmen have, but we don't know that for sure.

QUERY Do you know about their background, as far back as childhood, say, that these men never have any tendency to motion sickness, or have they overcome it.

SPEAKER Well, you see, all of us, in some point in our lives, have had some form of motion sickness. Now, with all of the Skylab crewmen, we have attempted to obtain from them pretty detailed information about their past histories, in terms of occurrences of motion sickness. They did fill extensive questionnaires as part of their preflight data baseline collection. And all three of these crewmen were no more or no less susceptible than the average person, I would think, perhaps Conrad, on the basis of his past history, I would have thought, would have been the least susceptible, and Joe Kerwin, on the basis of his past history, perhaps the most susceptible, of these three crewmen. But this apparently has no bearing on what happens in weightlessness.

SPEAKER Well, I think there are some other aspects, too, I think which I mentioned one day here. That with this crew too, we had some training with these - with this particular experiment during the preflight periods, and they had undergone some of these head movements, had actually undergone some training, and I still personally think that we may also be seeing some beneficial results of that type of preflight exercise.

PAO Paul Reese, do you have one?

QUERY Yeah, Dr. Hawkins, you mentioned earlier on that - back to this cardial deconditioning, that , at least theoretically anyway, it could go on and on and on. Do you have a redline at which point you will not permit them to go beyond and you will bring them in? And if so, what is it?

HAWKINS No, we really have not set any redlines on that. The way in which procede with that would be really one of cutting back on the level of stress that you expose the man to. Trying to stay under the threshold limit, and it's possible that you could have to even cut him out all together. Just discontinue the - that part of the study. We have not seen that yet, certainly, as you know. We have only cut back to the middle step of our protocol. But it is possible where you could have to just terminate the study, which would indicate that you did have some pretty significant changes there in these cardiovascular response mechanism.

QUERY What I'm driving at is, is it theoretically possible from what you know now, that the deconditioning would continue to a point where their system could not stand the stresses of reentry, or is heading that way?

SPEAKER I think we're hoping to learn something about that in this mission. We've seen changes in every flight we've flown, and the level of change which we are seeing right now is really just about the change which we've noted in the post flight of analysis of the Apollo crews.

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SPEAKER - is really just about the change which we noted in the postflight analyses of the Apollo crews. Now, as I said, we are still seeing some indications that things are still not stable and they're not plateaued out, there are still some changes that are taking place although these are certainly minimal. When you start comparing levels of heartrates, and your blood pressure levels, these still are very minimal, and certainly not approaching any alarming Deltas at all, but I think the answer to the type of question that you're posing here is, what are we going to see in the recovery period. And then we can really equate what we're seeing inflight with what that really does mean to us postflight. And, yes, it may well - very well have some direction for us in how we conduct 56-day flights.

QUERY Now, on the 56-day flights, if you do - if it's so indicated is there a way that you can stabilize this, or perhaps even reverse it to some extent through exercise or something like that?

SPEAKER Yeah, I think we feel definitely, that exercise is perhaps a deterrent to this. It is also felt that the lower body negative pressure unit itself ought to provide some conditioning of the cardiovascular system. And rather than just completely wiping you out, I think it ought to serve a useful tool in help conditioning your crewmen.

SPEAKER We're not proposing that at this point, certainly because we don't want to interfere with the results of our study either.

QUERY Dr. Homick, you said you'd seen some pretty substantial changes apparently in the susceptibility to motion sickness. I take it that's from studies you did on these men on the ground.

SPEAKER Yes.

QUERY Were those studies based on the same number of rpms that they're going through now in Skylab?

SPEAKER No, let me explain that again. On the ground we tried to select for each crewman a chair rpm which would cause him to reach this M2A level of motion sickness, this very mild level of motion sickness. After he had performed approximately 50 to 60 head movements, in other words we didn't want the man to have to be making head movements all day long, nor have the symptoms occur too rapidly. So on the ground, as a result of a series of baseline tests, we established for each crewman an optimal chair rpm, which would produce desired level of motion sickess after about 50 to 60 head movements. The first - the second time in flight when they were scheduled for the test we used those preselected chair rpms. If their thresholds had stayed the same as they were preflight, they should have reached this M2A level of motion sickness after about 50 to 60 head movements, but they went all the way to 150 head movements and still had no symptoms. So then for today's run we increased the chair rpm, stressed them even more, again they went to 150 head movements with essentially no symptoms.

QUERY Two other things, what are the symptoms of mild motion sickness?

SPEAKER Okay, I don't even think I can recall all the things we're looking at now, but for example, cold sweat. We've identified two levels of sweat, changes in skin color, essentially pallor. There's a series that we refer to as the nausea syndrome where it starts out with epigastric awareness, the very first vague sensation of unpleasantness in the stomach, which then could progress to what we would call epigastric discomfort, where now you'd have the first sensations of an early nausea. And then nausea itself, where you now have a sensation, like many of us have experienced I guess, on a ship or in a plane, the whole sensation is beginning to rise up your gullet, and you feel like you've got to start swallowing now, and this would be nausea. Drowsiness is a symptom of motion sickness, mild headache is a symptom, increased salivation is another symptom. I'm probably leaving a few out, because as I say there are quite a few, that can occur and they tend to be different for different people. Each of us probably has our own pattern that develops when motion sickness begins to occur.

QUERY One other thing, Dr. Hawkins, the training you spoke of, is that the chair training or what is it?

SPEAKER Yes, this head movements is what Jerry's talking about.

QUERY Dr. (garble) I believe that Dr. Kerwin today, mentioned something about possibly increasing the rpms to 30 for each crewmen. Do you think that that is a possibility?

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QUERY - increasing the RPM's to 30 for each crewman. Do you think that is a possibility and well, what do you think about that idea?

SPEAKER Okay, I - the crew obviously feels that they're no where near their threshold motion sickness and I heard that - that air-to-ground and it seems that they're quite - they're eager to go to 30 RPM to see whether or not anything will happen. We're of course, going to take this into consideration, and we'll be talking to the PIs about it at first opportunity I don't think the principal investigators even have this information yet, they're at Pensacola. And it's a good chance that we will go to 30 RPM for the last run on these two guys.

QUERY For Dr. Hawkins. What were the heart rates and blood pressure of both Weitz and Kerwin when you had to stop the tests?

HAWKINS Okay, let me think a minute. It's not written down here anywhere either. Joe's - Kerwin's pressure rose to about 115 to 120, and this is - this all begins to happen, you know, rather rapidly, rather sudden increased rate, with simultaneous drop in blood pressure. His blood pressure dropped to - it seemed like it was about 68 over 50. So, it had rather - rather significant now at that point the - it started to drop, it hit the release and then it immediately returns to normal baseline level and then there's hardly a drop - back to a 55 - his blood pressure again returned to normal, about 100 over 60. Now, Paul's didn't - we didn't see quite that much change in his rates. His rate got up a - just a little - over 100 heart rate. And the blood pressure was about 90 over 65. So, he was terminated just a little bit earlier, really, than what Joe was. Of course, Joe was there watching him.

QUERY What would it be for someone to black out? About what would the pressure drop to?

HAWKINS Well, you're going to see the systolic approaching your diastolic where the - where your pulse pressure is, you know, is almost down to zero, and your - thus you're not getting any - really you've lost efficiency of cardiac output. You're not getting enough blood to the brain. So, it would be approaching something like about a - well below 50 systolic pressure down to 40.

QUERY Can I ask one more question?

PAO Go ahead.

QUERY I'm wondering about the leg measurements also on the tests. Have you - do you continue to lose volume around the calf?

HAWKINS Well, yeah, I didn't touch on that. The - I think that - we haven't seen - you know, there's a

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continuation of that as rapidly as we noted in the beginning. I think that's beginning to kind of level off. Although, there is still some slight change there of - from one measurement to the next. And as you probably have heard, we only have - we only have the 13 inch and 14 inch leg bands onboard and what we really need right now, with the losses that we've seen are 12 inch leg bands.

QUERY Up until now, how much of a loss total do you think you've seen - since they've been up there?

HAWKINS Really, it's amounted to about an inch or probably - maybe a little over an inch in total circumference. And that I think is about an average for across the board. From an inch to an inch and a quarter.

PAO Paul, did you have a question?

PAO All right, Jim.

QUERY Dr. Homick, I'd like your opinion about why the Skylab crewmen have not become susceptible to motion sickness, when we know that at least half of the Apollo astronauts did?

HOMICK I'm not sure if I've got a real firm opinion about that. During the Apollo series, we had a number of crewmen who did indeed report symptoms of motion sickness. These reports always came within the first few days of flight, and thereafter the crewmen appeared to have adapted, and we got no more reports. During the Apollo series we never made the kind of measurements we are making now on Skylab. It's very possible that a large number of those crewmen, had we been measuring them, would have been showing precisely the same changes we're seeing now with the measurements we're making. Why, on Skylab, we didn't see any changes the first few days, or any reports of motion sickness the first - -

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SPEAKER - now with the measurements we're making, why, on Skylab we didn't see any changes the first few days, or any reports of motion sickness the first few days, I'm not sure of, again we may have had just three crewmen who were not destined to become sick. Pete Conrad didn't have problems during any of his flights. Weitz and Kerwin, although they were rookies and this was their first time in weightlessness, it may have been like many of the other rookie crewmen, who have gone up into zero g and have no problems.

QUERY Did Conrad show any symptoms on the ground in the chair?

SPEAKER Oh, yes. I think we can make anybody become motion sick in the chair on the ground at the proper RPM and by making enough head movements. Very few people as a matter of fact, you would you would have to have some pathological condition or some abnormal condition of the vestibular receptors in order not to become sick. Becoming sick is a pretty natural response to overstimulation of the vestibular receptors.

PAO Excuse me. We've had the line down for just about an hour. We've missed three station passes, and we're going to miss another one in a second. We have one question just submitted and we'll throw it back on the floor for one more. From Jim Slade of Westinghouse, I guess for Dr. Homick. When Weitz and Kerwin return to 1 G, is it possible they could be stimulated to motion sickness by the subpressure on the otolith?

HOMICK The subpressure on the otolith part, I can't comment on, but generally speaking, when they return to 1 G, it is possible that they might be as least, if not more sensitive than they were preflight. We don't know whether or not this change, whatever it is that's taking change in the vestibular system might show some kind of rebound phenomenon upon reentry into 1 G such that for several days, they might have to readapt to a 1 G environment, and therefore during that period of time be more susceptible than they were preflight.

PAO Okay, one last question.

QUERY Kerwin has been taking some skin and cultural samples while he's on board. Do you have any results of those? And have you seen any changes in cell reproduction and so forth - like that?

SPEAKER No, we haven't gotten any reports. Now the - he has done this, you understand, as a - just a routine exercise of the equipment. Now, there's no medical reason - problem for which he, you know, he conducted this experiment. So, actually, I have not even heard what his count was, He

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said the staining went well. The coloring of the cells was normal, and he didn't really give us a count on it. We were more interested in how the technique went, and whether there were any problems in the procedure or with the equipment at this point in time.

PAO Okay, ladies and gentlemen, thank you. Thank you Dr. Hawkins, Dr. Homick, and Dr. Rambaut.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 13, 1973
10:30 a.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
Milt Reim, PAO

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Time: 09:29 CDT, 20:14:29 GMT
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PAO Good morning. This is the overnight or all night change-of-shift briefing with Neil Hutchinson, the flight director. We'll let Neil start it off.

HUTCHINSON Okay. We had a quiet night last night; prepared the Flight Plan for day 165. And before I go into any anomalies or anything, let me just give you a little rundown on that. Day 165, that's tomorrow, 21st day in orbit. (Thank you, whoever did that. Was that you, Art?) We'll be running our last EREP pass; that's EREP 11, and we've got - we'll also be running a thing we call an EREP calibration, which is a calibration of the EREP sensors where we're going to point them at the Moon. And that takes place right after EREP 11. We've got one medical run, and our usual day full of ATM work. And that's about the Flight Plan for tomorrow; it's a full day. You'll recall that tomorrow is a short day for the crew, 14 hours tomorrow instead of 16, because we start the big circadian switchover tomorrow. You saw the EREP pass this morning, and it seemed to go exactly nominally. I'll tell you about a couple or three things that are going on or that have gone on that you may or may not know about. Let's see, they got a briefing last night, didn't they? Yeah. So you know about the coolant loop; that we've now got them both back in business. And tomorrow we plan on doing a little check on the secondary loop, just like we did on the primary loop after we got it back in business, and that is using the suit umbilical system on it in a staggered fashion to introduce the heat load on it slowly and make sure that we don't have any problems with that valve. Both the coolant loops in the airlock module are working exactly as advertised now. And, by the way, the technique that they finally got it on with was essentially the same as the way we got the primary loop on, with the one exception that we left it off overnight. Not last night, but night before last. And let everything kind of soak up and get homogeneous temperature-wise, and get as warm as we could possibly get it, and hit it with two pumps on at once, and it cycled up and the valve modulated and went just right. The going theory is, of course, as you probably know, contamination in those B valves for both of the loop problems. Late yesterday afternoon we had a problem with the M512 furnace facility, the chamber and facility. And the problem was basically we couldn't cut the power on the electron beam gun in the M512 facility. And the crew, after fooling around with it and pulling several circuit breakers and switches, managed to get the gun - turn - the powers turned off to the gun. However, this morning, in today's Flight Plan, we made a real-time change overnight last night. And

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this morning we are going to do some troubleshooting on that, and we hope to find out whether we really have a gun problem or whether the - whether we just had a sticky relay in there. And depending on how that comes out, we'll either run M553 on day 165, or we'll run M552. 553 requires the gun; 552 does not. 552 is the exothermic brazing thing that has its own - has its own internal source. Problems of significance last night - just almost nothing. Well, we have one new systems problem. Airlock module transmitter A, one of three 10 watt transmitters that we use to bring data down from all the airlock systems, including experiment data. We've experienced a definite degradation in the transmitter. It's putting out about a little - I'd say probably a little less than 2 watts of power. It ought to be putting out 10 watts of power. The degradation started about a day and a half ago, and it first appeared in the form of noisy data, and it took us a while to figure out that we really had a problem. There is no immediate effect on any mission operations. We are looking at the possibility, as you recall, we also have a little transmitter, a 2 watt transmitter on the airlock module that was used during launch phase and early orbit operations back in Skylab I. It is life-time limited, and we're looking at how long we think we can - how much time we can get on it. And we can use it and it - we have tried it out and it works completely normally. The only effect if we were to lose the transmitter completely, we would have a problem when we do have a real-time pass and have to dump the data from the airlock and dump experiment data. Those three things tie up all three transmitters at once. Now, right now when we're doing that, we're putting the real-time telemetry on this degraded transmitter and accepting the noisy data. And basically what it does is anywhere below something like 25 degrees elevation at the station the data is very, very noisy and drops in and out and the parameters are jumping around. That's the only new systems problem. For every one we fix, we find a new one. However, that one is not a bad one. I think that's all. Oh, one more. We had another rate gyro ditty last night. A new one. One we hadn't seen before. Rate gyro Y-3, which is one that we've had trouble with oscillating when it was turned off, last night oscillated for a while while it was on and spinning. And that's the first time it's exhibited that characteristic. The oscillations were very small, about a 100th of a degree per second; frequency, about 3 or 4 cycles per second. They were in evidence for about an hour and a half, and then they stopped. And we used that gyro for the EREP pass today, and it worked fine. That's it.

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PAO Okay, we'll start here with Art Hill.

QUERY Neil, on one of the teleprinter loads, there's a - regarding the EVA, there's an interesting statement here. Looking at procedures for hammering life back into the CBRM 15 while EVA and asking the crew if they seen any problem passing the hammer to EV2. Could you elaborate a little bit on some of the EVA procedures you're thinking about?

HUTCHINSON Well, it's the old Apollo trick. If it won't work, hit it, literally. They - of course, we think that - well, we - CBRM 15 is the one with the SAS contactor stuck. It's a relay. And we are discussing, and it's only in the discussion stage at the moment, the possibility of tapping on the package. Which, of course, is out on one of the ATM trusses that contain CBRM 15 to see if in some manner we might not not be able to cause it to operate.

QUERY Okay. Now, are there going to be - you're going to have a lunch period between - I guess that would make it two - two EVAs. Is that only if the twin pole is put out? Or - -

HUTCHINSON Yes.

QUERY Okay. So this hammering business and so forth, if there is no twin pole, would be just during the single EVA?

HUTCHINSON Yes.

QUERY And when would that come? Sort of - do you have any time frame?

HUTCHINSON I didn't bring that darn EVA Flight Plan with me. I probably should have. I really don't - I'm not sure, but I would suspect that any troubleshooting, if you're referring to when, we might be doing the hammer - the tapping. Refer to it as tapping not hammering. I'm sure it would come after we had successfully completed the ATM work.

PAO Bruce.

QUERY You got a hammer on the CBRM? Is there anything else in that same package, other than 15? Is there any other CBRMs in the same package?

HUTCHINSON I'm trying to think exactly what they look like. And if I'm not mistaken, there are - I'm not sure, Bruce. I really don't know. I want to say yes. I want to say that there are like - but I'm not sure whether they are individually rack mounted 1. Well, let me tell you this. They're all on a - I know that there are - I believe there are three plates of six. And you really need - we ought to get you some pictures of the way they sit out there. But the package that contains CBRM 17 is unmistakably identifiable as the unique unit. Now whether it's mounted on a plate with six other ones, I'm not sure - or four other ones.

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QUERY	You meant 15.
HUTCHINSON	I meant 15. Yeah.
QUERY	Well - -

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HUTCHINSON - four other ones.

QUERY You meant - well, then if it's mounted there together and the old trick of, you know, don't force - it, get a bigger hammer - isn't it possible that you could knock one of those other relays out or something like that?

HUTCHINSON Well, I said that this whole thing was just in the discussion stage and I think that entire thing will be looked at and I couldn't comment on that. I don't know what the mounting arrangements for the thing are and obviously we aren't going to do anything that could jeopardize one of the other ones for the sake of one that is all ready sick. The prime - primary reason that that thing was on that pad, of course, were to get their comments on what they thought about such a thing if we decided to do it.

QUERY Considering the - two questions about EREP, the one today with the cloud cover and watching through the TV, we didn't see very much and I'm sure they didn't either and especially through their comments when the cloud cover was reported. You know, I understand anything over 3/10th cloud cover is basically wasted time and that was the whole EREP pass - was at least 3/10ths.

HUTCHINSON No, that's not true at all. Of course, it depends on - and I'm not - since I'm not executing them and not doing the detail pads all I can do is plan the overall thing. I'm not intimately familiar with what we were after on EREP today but just to answer your question that's true to a certain extent but a lot of the details, of course, end up being things where you're looking at weather like - especially those ones where the sensors are - you see the VTS looking at cloud tops and trying to find thunderstorms. You know they were actually hunting for some thunderstorms there for a while. And, of course, then there are some of the instruments that the clouds don't bother that much and there are other ones that the clouds completely ruin so - and obviously you like to have clear weather with only X number of passes and you know Y-days left and the fact that we didn't get the full mission pass I think we have a tendency to maybe push it a little bit on the weather anyway. Because I mean it's better something than absolutely nothing at all, and you mean certainly are getting some stuff out of it. I'm not sure that the weather from that - you're seeing on the picture there when it looks like it's - just about 100 percent overcast is really that overcast. I am not too impressed with what I see on those pictures because it's very, very hard to tell ground detail even when it's - if you saw Washington yesterday it was clear except for ground haze. I mean there was no weather system at all involved and you couldn't make anything out. And the crew seems to be fairly enthusiastic about the kind of

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things they see on an EREP. For example, today this morning as soon as they woke up they came down with a request to get them some camera settings for using the camera out the window during the EREP pass and which means to me anyway that they think there is some pretty interesting stuff they're observing.

QUERY Well, could you explain a little bit how this calibration on the Moon is supposed to work. Do they end up with a set of pictures of the lunar surface from 200,000 miles away like they do with the regular EREP stuff?

HUTCHINSON Well, pictures in a sense that all the instruments are going to look at them as opposed to just look at it optically, yes, they do a scan of the lunar surface and then a 22 - boy - I wish - I should have brought that too - 20 some minute constant look at the lunar surface - at the entire Moon. And, of course, the Moon right now is almost full and the requirement I think we were supposed to be with in a day or two of full Moon. And as they come around we're just going to slew it out and it's not a particularly big maneuver and the instruments are all on and of course that's a very known source of heat and light so that makes an outstanding calibration point.

QUERY During our EREP briefing yesterday said they're be - at that time - at least 2 and fortunately very like 3 more EREP passes and now you say tomorrow will be the last one. Why was the third one cut off? I know it was still in the maybe stage, but why was it not planned?

HUTCHINSON They must have been referring to 3 left which would have been the case yesterday. There hasn't -

QUERY This was after yesterday's pass when they were talking about 1 today, 1 tomorrow, like you said, and possibly even another one after that. And if it was possible I just wonder why it wasn't - was it just a physical constraint or what?

HUTCHINSON No, it's just a matter of the days are all filled up as we home in here on the - I didn't - I don't know that there was - in fact as we homed in on the end of the mission here the last two or three days as far as I'm concerned - as far as I know EREP 11 has been the last pass which is tomorrow - which is day 165 - that's tomorrow.

QUERY What about the fuel cell shutdown? Could you continue to do EREP after that if you wanted to?

HUTCHINSON Yes. And that is scheduled, by the way, for tomorrow about 18:00. We're going to go to internal power.

QUERY Looking toward the end of the mission, do you have any details of splashdown yet - such as time?

HUTCHINSON They are certainly available. Milt we ought to be able to get them -

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PAO The latest time we have at this point, will, it will be updated is 13:48 Gmt which is 8:48 local time here, Houston time. And we'll try to get that updated sometime today.

HUTCHINSON There is a general planning package of the reentry sequence - the deactivation - retrofire and reentry sequence out floating around - it's no reason why you shouldn't be able to find them. It's got the retrofire times on it and lat and long, splash, and the whole thing.

QUERY Okay, we've got - I've got a couple of questions here from Mary Bubb at the Cape. She wants to know has the cooling system problem been solved to the point that NASA can conduct the two 56 day missions without concern?

HUTCHINSON Yes. I just - I was just thinking about that. Yes, certainly. We don't think, unless we get ourselves in a posture where we really jab one of those valves that we're going to have any more problems with the coolant system. We think we understand what was wrong with it and we're convinced now that it's working exactly right.

QUERY Okay. Is there enough power to do a full compliment of experiments during the 56 day mission?

HUTCHINSON During the next 56 day mission? Yes.

QUERY What's the latest on the parasol? Will we require a new sail?

HUTCHINSON That subject is being pursued with great vigor and the decision is not due to be made until I believe there is a NASA management meeting, Thursday. And I suspect by the end of the week we'll know for sure. Well, we certainly will know for sure. We're coming up on the day when we're going to do it. But the management council I believe is going to review that on Thursday.

QUERY One more final question here, how many manufacturing experiments today?

HUTCHINSON This day?

QUERY Today.

HUTCHINSON To date?

QUERY No, today. If there are any.

HUTCHINSON We are not doing any on this day, today. As I said before we are spending - we had some time to take out the M551 and put in 553 today. However, we're going to spend the time troubleshooting the facility - the manufacturing facility - the M512 facility.

PAO If there are no more questions - wait a minute one more here.

QUERY You said there would be enough power for all the experiments on Skylab III, what about Skylab IV and will Skylab III have all the extra batteries that Skylab II had?

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HUTCHINSON Extra batteries -

QUERY In the command module, fuel cells.

HUTCHINSON Yes. That spacecraft configuration as far as the CSM goes for Skylab III is the same. And as far as Skylab IV goes, of course, providing that the power situation remains stable or relatively so there's no reason that we can't press right on exactly like we are because of course we're running full up now. We have been ever since we got the panel out - completely normal orbital operations.

PAO All right, thank you.

HUTCHINSON Could I say one more thing about the - I was just reading this EREP thing - I've got to go back and talk about the weather for one more minute. It turns out that one of the prime objectives of today's pass and the one that you saw on the television was Mississippi, Alabama, and Florida over which there was a known 70 to 40 percent cloud cover and included studies of severe storm conditions in that area. Now you didn't see the first part of the pass because we don't have the real-time television - the pass starts up across the northwest and I'm not intimately familiar with what the weather was but I think one of the reasons you saw so much bad weather on there is we were studying the storm system when you saw the VTS television. Pardon. It wasn't?

SPEAKER The storm wasn't there, Neil.

HUTCHINSON It had really moved off the ground track? Well, unfortunately NASA has a hard time making the clouds be in the right place. We can do a lot of things but -

PAO Okay, Pete (Garble) has one question here. (Laughter).

QUERY When you said a full experiment package on SL-III, do you mean the same that you can do on SL-II or do you mean that some of the SL-II stuff that was cancelled is going to be brought back on board?

HUTCHINSON I can't - couldn't say for sure Pete about the things that they're juggling around. There is some consideration being given to the scheduling criteria for some of the experiments and I am sure that, and, of course, there are some things we didn't get done - there are some things that are going to need some further looks like S020 and T025 are a couple I can think of. I suspect there will be a certain amount of regrouping on exactly the experiments we do do, but it will be so close to the full complement that it's almost immaterial. All the biggies, I'm sure.

PAO We've had the final question from (garble) we will close this morning's session. Thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 12, 1973
6:35 p.m. CDT

Participants:

Milton Windler, Flight Director
Dr. Joseph A. Muscari, Principal Investigator, Contamination Measurements (T027), Martin Marietta Corp.
Dr. Jerry L. Weinberg, Principal Investigator, Gegenschein/Zodiacal Light (S073), Dubley Observatory
Dr. W. Royce Hawkins, Medical Director, Life Sciences
F. Dennis Williams, PAO

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PAO I have two brief announcements before we begin the press conference. First of all on Channel B tape dump last night, there was a letter read by Science Pilot Joe Kerwin to his wife. In line with the NASA policy for private communications between the flight crew and their families, this communication was not monitored and the tape of that portion of the Channel B dump was delivered to Mrs. Kerwin. Under that NASA policy for private communications for morale purposes, astronauts are premitted to make private calls to their families once a week, normally on their day off, there was no day off this past week. And I'd also like to announce that the Skylab medical experiment laboratory, the SMEL will depart Ellington Air Force Base at approximately 4:30 p. m. central daylight time Thursday aboard a C5A for San Diego, to be placed aboard the USS Ticonderoga, which leaves port at 10:00 a. m. central daylight time, Friday, June 15th. Today we have with us Milt Windler, the flight director, off-going flight director, Dr. Jerry Weinburg and Dr. Joseph Muscarri and we're expecting Dr. Royce Hawkins to give you some information on the deconditioning of the crew. Milton.

WINDLER On the condition of the crew. Well, I think we had a very good day today. Yesterday we talked about how we couldn't get our secondary loop going, and today we did. It appears to be functioning normally now. As you can imagine, we don't plan to give it any severe stresses, so we will be probably running that little test that was run on the primary loop, where you turn the suit system on a little bit at a time for a few seconds, and then a minute, and then a couple of minutes, and then 15 minutes. Probably we'll have the same procedure for the EVA. The - I think the spacecraft behaved well today. You all commented yesterday about how we didn't talk much to the crew. And today we probably didn't talk very much either, except on a couple of passes, when the crew talked to us so much. We couldn't get our answers straight on the ground, because they kept talking and they were asking them faster than we could answer, but the EREP pass went well. No problems with the control system or over the data take. We ran a medical run on Conrad, and we'll talk in a moment about the corallories experiments, particularly the S073. But essentially the spacecraft systems worked very well and we did initiate, you might say discussions with the crew on the EVA procedures that will be working a few days from now. We plan to send them a message asking them a few questions. Telling them a little bit about the philosophy that we plan to use in their EVA next week. And then we also have a preliminary

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Flight plan that we plan to send up to them tonight for their comments and any changes. And we're trying to get a little bit of a head start on that so that we have them quite well briefed when the time comes to do the EVA. And of course that'll be - the procedures for that are already very well established and we don't anticipate any big problem in accomplishing that. But I think one of our big things today was the disjoint experiment that I described to you that was going to happen today, last night. And that was with the S073 experiment, and I'd like to have Jerry tell you a little bit about that effort today, and what he's got from it so far.

WEINBURG Thank you, Milt. Well -

WINDLER Before we do that, I know that Dr. Hawkins has asked that we get him out of here as soon as we can, so maybe we can have a brief report from him, then we'll go on with the corollary experimente and let you ask some questions. Dr. Hawkins.

HAWKINS Okay. Quickly, the - I think the interesting point which we have run across now in the last two days was with the pilots experimental run yesterday on the M092 and M171. As you no doubt recall, we had to reduce the workload level on Dr. Kerwin two or three days ago, following one of his runs, where he did exceed his threshold limits on the maximum negative pressure level of minus 50 millimeters of mercury. So since that time he's been working down at a minus 40 MAX negative pressure. Now, we have now seen the same thing with Paul Weitz in his run yesterday, where again, he did develop a --

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SPEAKER - - one yesterday where again the, he did develop a sudden onset of heart acceleration with a drop in the blood pressure indicating the need to terminate that run. Therefore, he is now scheduled for the remaining part of the flight, at work loads of negative stress pre-sures if you will, at a minus 30, minus 40, and again at minus 40. Now today, to complete the story Pete Conrad made his run and he was able to complete the entire protocol as he has been performing this study. Any questions?

PAO Please wait for the microphones.

QUERY What does this mean for the other missions, as far as the work loads and the longer missions?

SPEAKER Well, it's hard to say yet what it means for the Skylab III. Right now we're not, we're not really proposing any definite changes to the work protocol. Really this, this really depends upon what we see in the post flight period, as well as what we see through the balance of this mission.

QUERY Two questions. What are the implications of this in reguard to the EVA plans? Is the deconditioning such that this may be impacted?

SPEAKER No, I don't think so. We're not seeing any interference with their normal day to day performance. This is under an experimental condition where you are subjecting the man to a known stress. And the interesting thing here is that this is the same type of response which we have seen in the post flight, post recovery studies conducted in Apollo. Now we have seen the same type of thing, and here we are seeing it inflight at this point in time.

QUERY It seems rather obvious, but I want to make sure. What you are seeing you believe is deconditioning effects of weightlessness, on the cardiovascular system, is that what you're saying?

SPEAKER Right. It's an alteration which we think is an adaptive machanism that is taking place within the cardiovascular system under the conditions of the flight, the weightless condition of the flight. And therefore, what we're looking for is where that end point is which we are identifying with the changes that we've seen in two of the crewmen, and I would suspect that we will definitely see this similar type of response in the Commander within the next run or two. This is an end point. Now whether it's going to extend beyond this point with extended durations of exposure to zero gravity, we don't know. That's of course the unknown. The second part of the question then is, what do you see in the post flight recovery period. And we have seen similar type responses in Apollo. We were expecting this to happen. And what this all really means in the final analysis is of course not answerable at this point.

QUERY Okay, you said you saw similar things in the past, after Apollo flights were over. And as I recall, some of those characteristics ranged rather widely, all the way from Irwin's reaction, if you recall after Apollo 15, up to practically nothing I think in the 7 crew. Are they at this point at the stage where say Irwin was after Apollo 15 recovery, where he had trouble with his balance etc.

SPEAKER You're talking about two different things really. You're talking about Irwin's vestibular problem that he was experiencing I think aren't you? You said balance. Whereas really you're talking about a cardiovascular system.

PAO Do you have other questions for Dr. Hawkins? Thank you Dr. Hawkins.

SPEAKER Okay.

PAO Would you like to go ahead now with the corollary experiments? I am sorry tohave interrupted the schedule.

SPEAKER Yes, I'd like to say something first about the experiment and Dr. Muscari, who is the investigator for T027. And I have shared in development of an instrument and am now sharing in the observation and use of this instrument. My particular interest is in making measurements of a phenomenon called the Zodiacol light, which we have observed for somewhat over a decade. And I'm very pleased to say today that this morning we accomplished something that hadn't been done before, namely to coordinate observations from the ground, and this is simultaneous, with observations from Skylab using very similar, nearly identical equipment and to make observations also from the Pioneer 10 and 11 asteroid Jupiter probes. Pioneer 10 is about - -

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SPEAKER - this is also from the pioneer 10 and 11 asteroid Jupiter probes. Pioneer 10 is about 4-1/2 or approximately astronomical units out from the Sun and is nearing Jupiter, reaching (garble) in December. Pioneer 11 is just this side of the asteroid belt. This has not been done before, has very seldom been done with any experiments, and has not ever been done with the kind of experiments that I'm talking about. Namely an experiment which uses a small telescope to measure a faint light all over the sky, which is - comes from two principal sources. One is the star background, all over the sky, in the Milky Way and out of it. And the other is a faint glow coming from zodiacal light, zodiacal coming from the work Zodiac, which is the path of the Sun and the planets across the sky. And there is a glow, which is concentrated toward the Zodiac and toward the Sun, which is caused by sunlight reflected off of microscopic dust particles throughout the solar system. I imagine the characteristics of this light, in particular of the zodiacal light, we learn something about the numbers of particles, their distribution in space, their sizes, their shapes, what the origin is, how many there are, and so forth. This can't be done just from the Earth because of the difficulties of looking through the Earth's atmosphere which has other sources of light, which removes some light by absorption, adds more by scattering of everything you see in the atmosphere and makes it very difficult to separate the zodiac light from the other things you're looking at. And this phenomena has been observed for some 50 years with photographic and photoelectric instruments and we still have not been able to resolve a number of the problems associated with it. By making a simultaneous observation like this, we're able at once to say something about the effects of the Earth's atmosphere on making such observations, which can be made from the ground easily. The problem is to make an interpretation by separating them, because all the things we're looking at have essentially the same brightness or same approximate characteristics. By making the measurements from the Skylab and the ground at the same time looking in the same direction, we're at once able to say the atmosphere is doing this and that and at once able to say something about the dust near the Earth versus the dust near the Asteroid Belt versus that in varying deep space, which we have not before been able to do. So this is the first coordinated observation. I'm happy to say that everything worked fine this morning. The weather was clear in Hawaii, which it had to be, the Sun had to be below the horizon, the moon had to have set. We had to have

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gotten in the time line for Skylab, which everybody cooperated to enable us to do, and it was a little bit easier with the Pioneers, they just keep going and going and we can turn them on almost at will. Everybody worked very hard to pull off a first and we're quite pleased about it.

SPEAKER Where Jerry is interested in the scattering of light from particles that are very far away from the spacecraft, the purpose of my experiment T027 is to study - this particular aspect - is to study the scattering of sunlight by any particulate cloud around the spacecraft. There has been some evidence on past flights that contamination could be a potential problem for our very sensitive space instruments. As you well know that on the Skylab, we have these with ATM and EREP instruments. So, with this flight T027 is a specific experiment designed to look at the buildup, the extent, the character of a contaminant cloud around the spacecraft. Where does it come from? How long does it stay around? What is its distribution? And also another part of my experiment, which has not been performed yet, the sample array, which will look at the surface effects of contaminants that deposit on optical surfaces, to determine again what effect will they have on the optics, where does it come from, how long does it stay around. Particularly today, of course we have one particular scanning mode that allowed us to look at the sky, both in the darkness, in this case it would have the - the content would be scattered light and zodiacal light and from starlight. And then again as the spacecraft got into the sunlight, illuminating the particulate cloud around the spacecraft, thus increasing the signal levels. Now we just got this data just before we got here. We're in the process now of looking at this data and we hope then be able to say, what is the extent of the cloud. A quick look says that there is something there and what we'll spend our next few days in determining to what degree is the contaminant cloud around the spacecraft.

PAO Do you have questions?

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SPEAKER - - next few days in determining to what degree is the contaminant cloud around the spacecraft?

PAO Any more questions?

QUERY I had a question. How much do you think the TACS gas, do you think that's a main contaminant around the spacecraft?

SPEAKER No, the gas with TACS is nitrogen, and thus it really just dissipates. It really would have no effect. What we're looking at - some of the retrorockets firing - there have been tests on the ground that show that it will deposit on optical surface, leave behind a fuel residue, that does not burn, and degrade the optical properties of it. Another important thing is the outgassing of the materials used in the sapcecraft. No matter how careful you are, materials are handled, materials are exposed to the salt air. When they get into a vacuum, they will emit particles and gases, these then will migrate around the vehicle because certain aspects certain surfaces that are cold they will deposit. You could get solar effects that will cause it to give a chemical absorbsion of the surface. And effectively then you get this film on the surface. Now even on this flight, the wardroom window is beginning to become dirty. And the astronauts have described it, and this is some of the things that we're looking at. What effect does it have in terms of transmission, or reflection.

QUERY As I recall, you got parasoled out of one side of your experiment. Is that going to affect your results greatly, do you think?

SPEAKER Well, effectively yes. The solar airlock is occupied by tha parasol, and thus in cases - in terms of the photometer, we would not be able to look at small scattering angles closer to the Sun. But the sample array is versatile enough it can, there's nothing prohibiting it from going out of the antisolar airlock. It is a candidate to go out the antisolar airlock in the remainder part of this mission. I can get important information going out of that airlock. The only thing I miss, which I wanted to get, was the effect of the Sun light on the contaminant. The phenomenon of photopolarization will change the character of the contamination. But, the important data still is to be gained from the antisolar airlock. And I'm hoping in the rest of the days on Skylab II to be exposed.

SPEAKER I'd like to add one comment to that. Most of our observations are when we're solar oriented with the photometer, which we both use. But, it is possible to also observe when we're in Z local verticle, EREP position. In fact, that's the way the experiments originally were configured.

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We would point in a particular position at the end of a long extension mechanism, and the spacecraft motion would scan us across the sky, and that's how we would observe. So we hope to, if the airlock is not made available any more during any of the missions, to be able to make some observations while in the other mode, and let the spacecraft scan us closer to the Sun, which we cannot do from the antisolar airlock alone. And it is very important for the background to be able to look at the angles closer to the Sun for the zodiacal light and the Milky Way for example. A great deal of information lies on the hemisphere toward the Sun.

QUERY Have you got any definitive conclusions yet on the zodiacal light, I mean any thing new from your space first or is the data still to raw and bleeding?

SPEAKER We've just seen it bleeding. The Pioneer data is, the maps are still being made. It takes about 6 hours to make a map of the sky from Pioneer. They can't do the two spacecraft at the same time, so they are doing them today. The data from Hawaii is on its way back now. We've observed the last 3 mornings of the same region of the sky. The data from Skylab, we've looked at part of it real time, the other data will go on the high speed data line over to Huntsville where it will be processed, and we hope to see it back very soon. So, all I know now is that all of the equipment worked. It worked well. The data from Skylab, which is what I've seen, I've heard of the others, looks especially good. It's very clean and very nice, and the instrument is operating very well indeed. We do have other knowlege of the zodiacal light already from this mission. Namely, one color, and we're looking at 10 different colors. We find that the sky in the direction opposite the Sun, has about the brightness we had expected. We had to in fact put in certain instrument settings for our observations, and the instrument settings gave us back about what we expected.

SPEAKER I want to say something else - -

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SPEAKER - instruments settings gave us back about what we expected.

SPEAKER I want to say something here. We're up here talking very calmly, but both of us are extremely excited. We worked long and hard for this time, and it is a - we're getting kind of tired now, but we couldn't be happier. The instrument is performing so well and it's the realization of thousands of people who have worked very hard to, not only build this instrument, not only design it, construct it, but also integrate it into the Skylab and now finally that it's performing and performing and giving us the information so that we can study the - both the phenomena that we're looking at. There's been a lot of rejoicing these last two days.

PAO Are there any other questions?

SPEAKER I'd like to mention another subject. I guess too, while everybody's thinking of some more questions, but, you know, you said that the parasol (garble) plus Z airlock, of course he was parasoled into into his minus Z, which is good, I guess. We ought to mention, though, this materials experiment and you're probably copied from the transcripts or what you heard on air to ground that the crew apparently have been very successful in activating the experiment, and have in fact done, I believe it's two of the wheels and perhaps have done more by now and the welding part of it. And we have been concerned about finding time on the flight plan to put those experiments in and apparently the crew is as I mentioned yesterday, are well able to schedule themselves to do things like this, and in fact the corollary officer remarked that they were probably an hour or so ahead of the flight plan in doing the things that were laid out for today. So we have every expectation that they will be able to conduct that experiment to a successful conclusion and it's going to be pretty interesting to see how that metals activity works out in space.

QUERY Will that be continued tomorrow?

SPEAKER I'm sure it will be, yes. They expressed a great desire to continue that. The primary thing in finding time for on the flight plan was to get the initial checkout accomplished, and that's been done now, so they can pretty well fit that in to their schedule. And they had mentioned the 552 and 553 experiments particularly as being two that they wanted to get to today if they could, and I'm sure if they don't today, they will tomorrow.

QUERY How about - they mentioned 555, which is the crystal growth, or do you know -

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WINDLER I don't think they have specifically mentioned that, but I'm sure they'll - I just have every expectation they'll get to do that too. I think we'll see quite a number of these experiments accomplished.

QUERY Okay. Is the parasol still orange, or do you know? Have you heard anything in the accelerated ageing? What are your plans?

SPEAKER Were you here yesterday or the day before when I talked about the 500 hours and that? Okay. Well, I don't know then now, anymore on the color since then, we - I believe it's tomorrow on the flight plan is a little period there to - or is it the next day - no, it's tomorrow - to look at the color again and give us another hack on the color. But the last report, the rope parasol was still the orange color, it was described as being flatter in nature, and they'll look at it again. The ageing tests are still going on. They will be done, I guess, maybe they'll be done today or tomorrow, something like that. I believe the meeting where they'll discuss that and decide is on Thursday.

PAO Are there any other questions? Thank you all. If you'd like the names of again, that's Dr. Jerry L Weinberg, and Dr. Joseph Muscari.

SPEAKER We're glad it isn't raining quite as hard this afternoon.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 12, 1973
9:30 a.m. CDT

Participants:

Dr. Dick Wilmarth, Earth Resources Program Scientist, JSC
Jack Harris, EREP Subsystems Manager, JSC
Jack Riley, PAO

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SPEAKER This is the JSC News Center, and we're ready to begin the EREP briefing as soon as we get some press participation.

PAO Good morning, sir, and congratulations on your intrepidness in getting here today. We, for this EREP briefing, have Dick Wilmarth, the Earth Resources Program scientist, and Jack Harris, the EREP subsystems manager, both from the Johnson Space Center. We'll begin with a report from Dick Wilmarth.

WILMARTH Good morning. The ninth pass for EREP has just been completed over Washington, D.C. and back across the midwest on out to - beginning about Grand Forks - Grand Forks, North Dakota. We had TV coverage on that; so we had some rather very interesting views of the cloud formations, the ground, the area around Washington, D.C., Chesapeake Bay area, and on out into the Atlantic Ocean and down across to - just off the coast of Recife, Brazil. We have completed, as I said, nine. We have statused about eight of these EREP passes; so let's turn to the board here and see what we have accomplished in the way of - of ground tracks. And I'll give you a general overview of the kinds of information we've obtained and then turn it over to Jack here to look at some of the sensor performance of some of the sensors that were on board. To begin with, the map shows what we have completed in the way of ground tracks for the first nine EREP passes. In sequence, the long pass identified as number 20 began way out over the North Pacific and extended on down into South America, and that was the first pass that we completed. Then we completed number 63, and then 6. Then we completed 19, and then number 34, and now we've just completed 61 - I mean that we've completed 33. We have three more planned EREP passes. They are identified by this symbol as potentials, and we are planning those to coincide with number 6, number 20, number 5 and a lot of that the - let's say the - number 6 will depend upon some of the weather conditions. And that is the general sequence of planning that we go through in our picking of the EREP passes. Now these passes will be completed the next up and coming three, on the next two days. The first one we are now planning will be track 5 down through here. Then we will be planning possibly 20 and what we call is a lunar calibration pass. That is to determine with the Moon as the background, which is a very excellent calibration source because of the lack of atmosphere and the general overall uniformity of the reflectivity is a good source for calibrating the instruments. And we plan to do that so that we'll be able to relate their sensor activities and the sensor

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data to what we've already observed on the ground tracks 1 through 11. Now what I've shown here is essentially the ground tracks and - where we have had the sensors on. In other words, on ground track 19, going from there to there, is essentially the data tape that we did first on ground track 19. You can see the other symbol shows we have extended that on a later pass showing the data tape areas. Well, that looks like a lot of passes, and we do have a lot of data. And, generally, what we have accomplished in the first eight passes is the - is to turn the sensors on over approximately 190 areas that are a direct interest to the principal investigators that have been appointed to analyze the data once we've returned them to JSC, processed them, and distributed them to the - to their laboratories. Now that means that we've got considerable amount of data over a large part of the - of - part of western and well as the midwestern United States. Now what we have accomplished is essentially take data over the countries that you see here. Mexico we've covered. There are six principal investigators there that have test sites identified. And we've taken data for those investigators. We've taken data down across the Central America, Guatamala, and Honduras for investigators that are interested in volcanic areas. We've taken data down on into Columbia, where studies of the general - pardon me - general, let's say land use resource management of those areas. And down - coming down through here on track 48 and certainly down here on track 33, as well as 19, we've obtained - and we've had good weather in - in Brazil area. We've obtained a lot of information, both electronic and photograp''c, for the areas in the lower as well as the upper Amazon River Basin for the Brazilian goverment to do their own - their resource management activities. So we've ob - we will obtain on the next pass, track 5, some information for investigators from Venezuela. So generally, that's the - the overview of where we have obtained data and the general number of investigators of task sites - areas that we have sensed and will be returning the data return to JSC for distribution. Now I said that we've obtained some sensor data over sites, and if we look at it from a PI standpoint, in other words an investigator's standpoint, we've got data for about 50 to 60 investigators most of which are in the United States. In other words, I would say that we've got 10 or 12 investigators - pardon me - in foreign countries that data have been obtained for. Now what have we done? I mean, where is the data that we have obtained - what is it for use? And so let's turn now and look at the map. If we look at the general types of data, in other words the electronic

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or the photographic data, for use like crop inventory, forest inventory, geologic mapping, mineral exploration, sea state studies, and things like that, I can generally say that in the field of mineral exploration we've had excellent coverage from the photographic as well as electronic standpoint over the southwest part of the United States and down into Mexico. In other words, these areas have been - -

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WILHARTH - - state studies and things like that, I can generally say that in the field of mineral exploration, we've had excellent coverage from the photographic as well electronic standpoint over the southwest part of the United States and down into Mexico. In other words, these areas have been clear and we've obtained some very excellent data for the investigators there. As far as the agricultural areas, we've obtained good data for forest inventory over Colorado and over northern California. We have turned - we turned the sensors on over the Great Valley of California, San Joaquin Valley, and down through, essentially the midpart of California; so we have good data for those. As far as a understanding of the range conditions and the grass growth and things like that, we have obtained data over the Colorado plateau. And that essentially was done on track 20 and track 34. If we turn to our urban studies, or looking at some of the urbanization areas, we have obtained some very interesting data for a good number of census cities, such as Pittsburg, Cedar Rapids, Davenport, Ashville, North Carolina, as part of the sensor collection of - from EREP. Another area I think is of major interest, and that is the sea state or ocean studies. And for a reference, we did a rather unique data collection for hurricane Ava. Track 49 is essentially a special, unique pass in co-operation with NOA and some of the Air Force people to obtain for the first time some microwave data in connection with a very active aircraft program conducted by NOA in consort with the spacecraft data. What was accomplished is essentially for the first time obtained some laser propholometer data, micro-wave data, which has been used for determination of the wave height, and therefore, the wind conditions over hurricane Ava. We've also obtained microwave data over the Gulf, as you can see here on these tracks 3, 20, and 48. Looking at some of the sea-surface temperatures and looking at some of the different sea-state conditions, in other words, wave height and wind conditions, in order to better understand the boundry conditions between air and ocean. The photographic data will be used to look at it from the standpoint of what are the color vari-ations and therefore identification of such things as the loop current in the Gulf. Another area that I think is very im-portant and I think it's especially important in this sense that all of the sensors have operated extremely well. We have now in conjunction with the groundtruth information, such as collected over Great Salt Lake and Wilcox Playa, and some of the lakes and ocean sites, an understanding of an integrated sensor analysis and sensor performance study. So that this gives us a real strong data point relative to how well sensor data of this sort can be obtained from space and used in the study of various types of land resources. Now, I think another

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area that is important here is that we've got - let's see, for the land use investigators, those people such as state agencies. For instance, the state of Ohio, state of Maryland, Indiana, Illinois, have banded together as their individual state organizations in order to use the Skylab EREP data for a total evaluation of the - their land and natural resources. We have obtained data over California, and as I said, Ohio, Illinois, and Indiana. And I think on this pass that we just completed along groundtrack 61, the data that was collected, which would be exceedingly interesting and useful to Maryland, as well as the - parts of eastern Pennsylvania where a very strong group from Pennsylvania State is interested in looking at the geologic analysis of the Appalachian Mountains. Now, because of the imagery capability and the sensor data, we've got several investigators that are interested in updating geologic maps as well as cultural maps or just common ordinary topographic maps. And some of the data this is obtained over the Chesapeake Bay today is going to be used for updating some of the old maps of those areas. Let me talk for a minute on Chesapeake Bay because we do have a very strong program there. It's the - in conjunction with the U.S.D.I. and conjunction with the Corps of Engineers. We have approximately eight investigators that are studying the Bay area itself from a land use, a geologic, and ocean, as well as a bay current dynamic standpoint. And I'm sure that based on the TV pictures that I've seen, that the data that we will be returning here to JSC from groundtrack 61 will be exceedingly useful for their overall study. I think that kind of summarizes the general areas that we have covered, the kinds of investigations that we have obtained data for; so why don't I stop here and if there's any questions, why I'll answer them later.

PAO Okay, Mr. Harris.

HARRIS I would first like to summarize what experiments we do have on board and what the problems we've had with those up to date. (Could I have the first viewgraph, please?) Very quickly, the EREP experiment system consists of what we call the S190A, the multispectral camera system; the S190B, Earth terrain camera that's used out of the workshop; the S191, infrared spectrometer; the S192, multispectral scanner; and in the microwave region, the S193 microwave altimeter, radiometer, and scatterometer. And then the S194 L-band radiometer. I'd first like to say, because of the power situation on the vehicle, we had to reschedule some of the activities that we had originally planned. We condensed the original checkout from 3 days to 1 day. In doing that, we created quite a few procedure problems for the crew and for ourselves. However, we feel like we have those procedure

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problems corrected, and the instruments are operating satisfactorily. Now, I would like to go into the first few passes, whereby we did experience problems becasue of the power situation. On the S190A, multispectral camera, during the first pass, we noticed that we had malfunction lights on all six camera stations. (Could I have the next viewgraph, please?) The camera array consists of six cameras with magazines and two cassetts that's folded down over the MDA window. The MDA window is covered with a shield or a cover on the exterior surface of the MDA, and I'll be talking about that in a minute. But anyway, we had indications that all six stations were malfunctioning. We investigated that. We submitted a special procedure to the crew to determine if the film was being moved within the magazines, and it was. So the indications that we were getting were erroneous. And I'll explain that on the next slide. (Could I have the following slide, please?) Very simply, we have a takeup spool and a supply spool with the film indication of readout or malfunction light being sensed off the supply spool. What we determined was that we had loose film on this spool. This spool has to rotate in order for the sense circuit to work and to indicate that the system is functioning properly. We did replenish the film for 190 because of the - -

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SPEAKER ...spool. This spool has to rotate in order for the (garble) circuit to work and to indicate that the system is functioning properly. We - we did replenish the film for 190 because of the heat problems we had on the workshop, and doing so, the film is loose on the spool. Until the travel is taken up with the takeup reel and the film becomes taut, we do not get an indication that the film is being transported within the magazine. The crew did verify that this was the case, and we have achieved the photography coverage from the first pass onward. Could I go back to the first slide, please? In pass number 4, however, the crew inadvertently failed to open the MDA door; so we feel like we did not achieve any data on that particular pass. I might say that we do have an indication on the door position, and that door indication has always indicated to the crew that it's closed. So we've asked the crew to visually look through the window to see if the door is open. And that has been satisfactory since then. Now the S190B Earth terrain camera was not operated during the first four passes because of the power situation. It was operated on the fifth pass satisfactorily, and I believe it's been operated since. The Earth terrain camera is operated from the scientific airlock out of the workshop. Now the infrared spectrometer, the S191, has two detectors. It has a long wavelength detector to detect the thermal data; it has a short wavelength detector to gather the other infrared portion of the spectrum. On the long wavelength portion of the detector we have a molecular cooler. It's a cryogenic cooler. It cools the detector down to between the range of 90 to 95 degrees Kelvin. Because of the power situation on the vehicle, we were not - the MDA wall was not up to temperature, and so the cooler would not sink to the wall. We had designed the system for an MDA wall temperature of 60 degrees. During the power problem, we experienced the wall temperature as low as 47 degrees. So we had to find a way to achieve proper cool down on the long wavelength detector. Could I have the next slide, please? I might say that what we're talking about is in two portions. The crew uses a view finding tracking system within the MDA to locate the target and to track the target. The spectrometer portion is exterior to the MDA, and this is where the cooler is located. Could I have the next slide, please? In a very simple diagram, the short wavelength is not cool; the long wavelength cooler is cool. We'll have to have a 60-degree temperature to sink that. So we worked up a procedure whereby we would turn on the electronics of the spectrometer pre - long enough - previous to the pass, in order to heat up this area, because the cooler uses rulon rings. The rulon rings need a temperature of 60 degrees in

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order to seat. So we'd have the refrigeration cycle to commence. And I might add that, if we can go back to the first slide, it took us, I believe it was, four passes to work out the power profile, whereby we can get - achieve the cool down cycle. Since the power problem is - is not as critical, we have been getting satisfactory cool down of that detector. And we have been getting long wavelength data. Here again, the short wavelength data has been good from the very first pass. Now on the multispectral scanner, the S192, we use another cryogenic cooler to cool the detectors there. We have two types of detectors. We have the long wavelength again, not of the same band width as the 191, but a long wavelength detector that's cooled by the cooler and also all the visible channels. There's twelve visible channels that are cooled by - by the same cooler. Because of problems in the alignment, we do not feel like we had any data on the first three passes relative to the thermal channel. That has now been corrected. We also feel that the first three passes were marginal on the visible channels. We were achieving data. We questioned the quality of the data. That had been corrected, and the instrument has been operating satisfactorily since. Could I have the next slide, please? This is just an overview of what we're talking about with the S192 system. Go back to the first slide, please. The S193, the altimeter, the radiometer, and scatterometer have all functioned this plan with the exception of the first pass. Because of procedure problems, we did not achieve some altimeter data during the very first pass. The subsequent passes have been satisfactory. The S194 L-band radiometer has always operated as planned. Now the pass today utilizes the TV camera with the S191 experiment for the first time, and I understand there's some interest to how we do that. And I guess - let's see - Could I go back to the S191 overview? It's the colored photograph, the one previous to that. It's not a very good one to show how we use the TV camera, but - - The crew has an option on the view-finding tracking system to mount a 16-milimeter camera or to use an optical adaptor and to mount the TV. They have the option of - they have a 10 to 1 zoom capability within the telescope itself, and they can track a ground target up to 20 seconds through a tracking system that's available. So they - the crew installs the TV, what we call the TV optical adaptor, at this interface and then installs the TV to that. And then they use the eye piece to track the ground target and achieve the ground target, zoom in on it, up to 20 seconds. Any questions?

PAO Okay, we have picked up a couple of more newsmen. We'll take your questions now if you have any. Howard Benedict.

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QUERY How long is it going to take you to process this data from these twelve passes or eleven or twelve passes, when the data comes back here?

SPEAKER I think the general plan is to have the imagery processed so that in approximately 30 days after we've returned the film here to JSC, that preliminary copies will be available for review. And a follow-on then would be to develop and produce the necessary data packages for the individual PIs. And each PI or investigator has their own specific requirements as to film, to photographs, and certainly the magnetic tapes. Now the magnetic tapes will be brought back here along with the film, and it'll be approximately - well, we'll process it in generally two steps. One to - to process enough of the channels on the scanner data to get some tape-to-film conversion done, so we can see the areas of coverage for that scanner specific to that individual investigator. The investigator then will be receiving a screening film, and the film then would be - from that film he will pick the area as well as - which would be identified by time hacks, GMTs. And then we'll process the channels of magnetic tape that he will specifically need for his individual investigator. To (garble) we won't do that for the microwave data. It'll be done primarily on the basis of - of GMT or time hacks over his site and the data that he will need, as well as the supporting tabulation data, such as the orientation of the spacecraft and things like that.

SPEAKER I might add that in the hardware phase, we have about a 3 week of activity to try to determine the health of the hardware before the next mission. And we'll be - it looks like 3 weeks of analyzing the data before the next mission.

QUERY The advancement of the next mission by two weeks going to put a little squeeze on you in that respect?

SPEAKER Yes, it is. But we still think we can make it.

PAO Any other questions? Al Rossiter.

QUERY I came in late, and I may have missed it, but you said track 5 was going to be the pass tomorrow?

SPEAKER Right. Track 5 tomorrow.

QUERY Where will it start? Where will the data take start?

SPEAKER As you see here. The - yeah, that's the actual data take that we've plotted on the map. So it will start off up here at about- Oh, what is that? - a hundred and - I guess 110, 115 longitude and extend down across Brazil to just off the coast.

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QUERY What are your plans for the next couple of days? Do you have tracks planned ahead for, say, the next 2 or 3 days?

SPEAKER Yes. Tomorrow we'll be flying track 5. And then on - in the following day, we will be looking at ground track 20, which we - which was the first EREP pass. And we'll be doing a lunar calibration in order to provide us the necessary data for determining the response of the instruments.

PAO Al.

QUERY One more. In the - today's use of the TV camera through the view finder, what is - at maximum zoom, what would be the best resolution that the television image would have?

SPEAKER Of design, goes 200 feet.

SPEAKER Yes. We think we would probably achieve something a little better than that.

PAO Howard.

QUERY Then when will you do track 6, the last one?

SPEAKER Track 6 is a potential.

QUERY Potential.

SPEAKER Right. We - we show that here because weather and certainly other mission factors may throw us into that. So we may run that one, but right now we're only planning track 5 and track 20.

QUERY And could you give us some of the highlights of track 5? What will you be looking for there?

SPEAKER Track 5 is - well, we have a - a spot right in here known as Cape - -

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SPEAKER - - 5 and track 20.

QUERY And could you give us some of the highlights of track 5. What will you be looking for there?

WILMARTH Well, track 5 is - well, we have a spot right in here known as KSC that we're interested in obtaining some data over for Bravard County in their land use analysis. And then back up across over the general Great Plains area where some very interesting studies on soil moisture are being conducted by Dr. Myers at South Dakota State University. Some of the over - let's see, the Great Plains ground water - water management studies, which are including state geological surveys of Iowa and adjacent states is going to be a prime target. Then on up into - certainly the parts of the Colorado Rockies, northern extension for geologic analysis. In Wyoming the areas of Big Horn Mountains and things like that. So, those are some of the general highlights of that area and then, as part of it of course, there'll be target areas for sensor performance. How the sensor responds to a different enviroment. It's going to be another part of that whole package. Then if you get down across some of the areas down into Venezuela, some of the investigators there are interested in understanding the gelogic analysis for the Maracabo basin, and the incoming sedimentation rates at the land and water interface. And then again down across - over into the Amazon basin and Southeast Brazil for general land use management and planning for the Brazilian Goverment. So those are kind of the highlights for the individual pass there.

QUERY I forget whether or not you give the time that that pass starts tommorrow.

WILMARTH I did when I came over here. Ah, let's see. No, I forgot. I think it's - I think it's right around 10:00. I'm not sure on that.

QUERY Wouldn't that put it over KSC around 10:15 or 10:20? Something like that.

WILMARTH Something like that. The spacecraft moves at 4 miles a second, so that's about the speed.

QUERY Did the haze and clouds over Washington this morning hurt any of your plans?

WILMARTH We had forecasted that there was haze, or a polution alert we found out later, in the general area and some rather high cumulus, and I think that's probably one of the reasons why it didn't lock onto a specific site and zoom in on the TV. We don't think that's going to affect the analysis of the data by the individual investigators.

QUERY Could you give me a few more specifics of what you'll be looking for with KSC in Bravard county?

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WILMARTH All right, the - That's a rather new venture down in that part of the world where you've got Disney World and a large influx of people and are looking at it from a standpoint of the effects of urbanization on the environment. As you know, there's a lot of bird habitats and wildlife preserves in the area, and, of course, the general growth of the Bravard County itself and general land use, recreational planning, and things like that is going to be the main theme, using both the aircraft and spacecraft data.

QUERY All right, how many aircraft as backups?

WILMARTH I think there's - I think KSC has one, and then support out of here for - as part of the spacecraft underflight data.

QUERY And we do have some questions from listeners from various areas around the country. One, do you plan to photograph all the countries outside the United States that were originally scheduled? And if so, when?

WILMARTH Jack, would you like to try that one?

HARRIS That's your field.

WILMARTH I guess the answer to that is - The SL-III and SL-IV activities, I think, are going to be directed to trying to overfly and obtain as much of the information as requested by the individual investigators as possible. Now, we know that weather is a very important factor. And how that will impact is relative to flying over all of the countries that we planned. There are essentially 21 countries with 41 investigators that have requested data on SL-II, III, and IV. And, again, it's a point of - we'll try to overfly them, but it's weather constraints, mission constraints, and everything else. So, in general, we can say that we plan to do it.

QUERY Okay. Please describe the Houston Area Test Site.

WILMARTH Well, the Houston Area Test Site, or the acronym, HATS, is an 18 county area here centered around Houston, and some 50,000 square miles or something like that. And I say it's a major metropolitan area. Certainly a water land Gulf interface and it has many, let's say, different parameters with a rapidly expanding environment for the urbanization. And it contains natural forests as well mineral (garble) water problems, and so it's essentially a major test site for developing the techniques here at JSC for land use

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analysis, and the techniques that go with that kind of activity.

QUERY How many times do you plan to observe the Houston site during the 3 Skylabs flights with the EREP sensor?

WILMARTH Well I can't say exactly because - weather of course, is a factor here, but in SL-III I wouldn't guess right now because of - the trajectory plots are still being developed. But it looks maybe like we'll have 2 or 3 passes over the Houston area test site in SL-III.

QUERY And how many times has it been observed so far?

WILMARTH Well, we had a little bad luck with the weather on ground track 34. We did overfly it and we did get some data, but the cloud cover did interfere with the data collection over the hatch area.

QUERY How does the Houston area test site fit into the total EREP experiment plan, or what is the significance of the Houston area test site? I think you may have to cover that in answering number 1, unless you think that -

WILMARTH Well I would like comment on that because the Houston area test site is a - is one of the - what we call a ground truth test site for developing the techniques of remote sensing of various environments. Several investigators within the EREP program are using this area as - because of the abundance of ground truth measurements and the variety of conditions that are present here within the area. So, it's a major important factor - a major important site, such as the carets or the Chesapeake Bay area, as well as the Arizona regional ecological test site out around Phoenix. So it's a major area for the EREP program.

QUERY And what can you tell about flooding from space?

WILMARTH Well we don't space to tell about flooding here. That's a very prevalent problem today at Houston. The - we know from space photography, and let me assure you, you can observe the effects of floods because of the variation in the spectal response - of the flooded area, it's wet and it's certainly disturbed relative to the unflooded areas or nonflooded areas. So that hopefully with EREP sensor cabilities, we can identify the areas that have been flooded, and perhaps some of the other important parameters that go on with flood rehabilitation and flood conditions.

QUERY And finally, I believe you may have in general done this during your presentation, but please identify the path of the passes geographically - places under the track. There are a number of the people that can't see the map and things like that.

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HARRIS All right, lets begin with the top. The ground track 61, begins off up here around Grand Forks, North Dakota, comes across Lake Michigan lake area, across the Chesapeake Bay area, and down across to the South Atlantic. Ground track 33 began off up here around Vancouver.

END OF TAPE

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WILMARTH - - Lake Michigan, Lake Erie, across the Chesapeake area, down across to the South Atlantic. Groundtrack 33 began off up here around that Vancouver Island down across Montana, the Dakotas, down across Illinois, Iowa, Illinois, down through - into the Carolinas, and down off into the northeast part of Brazil. Groundtrack 19 began over here about - I think that's Coty, Wyoming, or something like that, and down across the Missouri River, down across the, just about - just about north of the junction of the Ohio and the Missouri - the Ohio River - St. Louis, I think that's it - down across the Puerto Rico - and we follow on - begin on up into Vancouver, or the Puget Sound area, and down through the - Brazil. I commented on pass 5. Track 48, is very similar, it's farther down - it came across about Denver, it began out off the coast of the mouth of the Columbia River, and down across, about to Saint - New Orleans, down across Cuba down across Columbia and the Amazon Basin and into ... just off the coast here of Brazil. The track 34 began up in - just west of Salt Lake City, in across the Rocky Mountains, and down across Houston, across the Yucatau peninsula, down into the western Arabian Sea. Groundtrack 20 began 168 degrees west Longitude, which is not far from the west coast, came across the coast and on down through - across Brownsville, Texas here, down across Yucatan, down in the Honduras, Guatamala, Central America, came across Columbia and down on into Boliva and down on into Paraguay. That's the track that we will be flying on ground - on day 165 or two days hence. So, on the original groundtrack 20, we stopped it off up here in - in the - the - Boliva. Groundtrack 6 began in Northern California, came across Arizona, Utah, Mexico, and stopped over here in just west - or just about in Mexico city. Grountrack 63 came across San Francisco, across the U.S. border and down across into - what's the - Mexico City, here. And down - Groundtrack 49 was the hurricane that we sensed about June 6. That's generally the areas that we covered.

SPEAKER A little different note here, Hal. How the astronauts are doing, are they performing as they hoped they would, did they recongnize a lot of the things they hoped they would, things like that?

WILMARTH Yes, I think have done an exceedingly excellent job on the switches, observing, the observations by the crew, this morning, especially Paul Weitz on the

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VIS, on the TV camera, were excellent. He even picked out the features, very clearly, very easily and their observations are a great help. From the voice tapes, we go back over them and identify the things that they - such as various cloud features and ground features, and update our wn data base from those observations.

PAO Okay, thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 11, 1973
7:58 p.m. CDT

Participants:

Milton Windler, Flight Director
F. Dennis Williams, PAO

SL-II PC-41A/1
Time: 19:58 CDT
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PAO Okay, we can begin now with the status report from Milton Windler.

WINDLER Wait a minute, hold it. Yeah, here it is. Okay, the panhandles of Oklahoma and Texas. I thought that Dallas - I thought it was supposed to go over Dallas. I didn't know that was in the panhandle. We had a good day today anyway. Well, we had mostly a good day. The only bad part about it was we only got half success, I guess you'd call it, at running our AM coolant loop. We're still trying to get the secondary loop to behave. We did run the suit umbilical system loops with the primary coolant loop this morning. And it all worked fine so we're squared a way now to use our system for the EVA. And we're unfortunate - Thank you very much. Unfortunately we couldn't get that valve unstuck in the secondary system. Although, we tried it twice as you're probably aware. The first time we started the second pump in that loop while it was still running, while the first one was still running and that probably put a pressure differential on it of around 70 or 80 psi. And that didn't work, so we shut the whole system, secondary system down, and let it warm up a little bit to probably 50 degrees or so. And then we turned both pumps on simultaneously, which put over 200 pounds per square inch in the system. And even that didn't open it. In fact, I have to admit, that I think that we might have even closed it a little bit more. As you'll recall, it was only partially, in the partial cold position in stead of full cold. And now it's probably not completely cold, but in a cold position, but it is perhaps further cold than it was before we started. The EREP pass, as you've seen from this handout here, was a good one this morning. The EREP people are very pleased with the results that they're getting. In fact, we've concockted a little scientific status to send up to the crew tonight. And one of the things that the EREP people are most happy about is the chance to get some information on the typhoon Ada. I didn't realize that they had several aircraft up in the air at the same time and also some surface observation from ships plus the S193 information from the spacecraft and the cameras that were taken from the spacecraft. But, back to today, the pass as you know had several clear areas in it in the United States. We were hoping to get - I guess this weather that was up around Dallas this morning must have made its way down here, but we were looking for some severe weather. We'd like to have some developing heavy thunder storms and developing tornados if we can, but of course that wasn't available this morning. It may be here this afternoon, I'm not sure. But, it had dissipated a little bit, I think by the time we actually made

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the pass. And then it continued on. And the weather was excellent in South America for this time of year. The EREP Officer was very pleased by that. Almost the whole central, eastern edge of South America there. Brazil, the central part of Brazil was clear. We did the medical runs. We had a little bit of a scare this afternoon when the - one of the corollary experiments, the S073, appeared not to be working correctly, but now the crew did cycle a little photo multiplier tube in the, in the instrument, or a cover on the instrument that covers this tube. And it apparently was perhaps cracked just a little bit since it hadn't been operated since the launch - -

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WINDLER - the instrument or cover on the instrument at - that covers this tube, and it apparently was perhaps cracked just a little bit, since it hadn't been operatied since the launch and it - it has now apparently seated itself and is working correctly. So, that is the instrument that is going to be flown tomorrow or run tomorrow with a joint observing program with observations from two pioneer satellites and a station in Hawaii. So, the scientific community's very excited about that. In fact, you might have the PI from that - come tell you about it tomorrow or whenever he gets some data down from it. And the ATM continues to take data. They transmitted down some good pictures of that large coronal feature that was observed partially yesterday and continues to be active today. I think that was about it. I think the crew was in a good mood today. They did - we've had some confusion I guess about the M509 experiment - this is the one where they sit in and fly around the upper compartment of the spacecraft. And they asked us if they could take the launch restraints off and we said okay, because they are trained to do that and the other crews have not been so trained. And they probably - they haven't - I don't think they've indicated - they may have put it on the recorder but I haven't read it yet. But they have - if they haven't, they will go ahead and remove those launch restraints. But right now we don't have any plans to fly that experiment on this mission. It had been actually - it'd sort of been ruled out as a candidate - or at least been downgraded as as candidate because it does require a lot of crew time and when we had to adjust the timeline before even the mission started why, it had been given a lower priority for this particular mission. It's still an important experiment but it's one that we felt would be better to try on subsequent flights. So, unless something changes why we would not be doing that. But I guess because of the launch restraint thing people have got the idea that we're more serious about flying that experiment than we are. I think that's the highlights anyway. If y'all have any questions I'd be glad to answer them.

PAO Please wait for the microphone.

QUERY I noticed the last few days that the crew's been talking a great deal less. Are they just settling down to work or what?

WINDLER Well, yes, that's the answer to that. I'm pleased to see it, frankly and we commented in Control Center this morning that it seemed like that this was the kind of day that we had hoped Skylab would be when we were getting ready to fly it. We try not to talk to the crew

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unless we think that they are free to respond. If we - we know from the simulations that it bothers them somewhat when they're on the ATM console and unless they were in a particular building block - an observation that doesn't require a lot of switch activation and it doesn't require a lot of their attention why we try to avoid calling them. And we have in fact waited on several occasions today until a more opportune moment. And I think that this is the kind of thing that more - is more like the training that we experienced in the pre-mission simulations where we give them the pad information in the morning and if we've done the job right we don't have to update that. And if there are no failures they proceed on with their business with very little assistance from the ground and very little conversation to the ground on their part. The observations that they have - they are accustomed to putting on the voice recorder and we get it subsequently So, I think that's probably an indication that the flight is settling down into a more routine-type effort as opposed to the different procedures - things that we've had to use in the past several days that they really had been trained to do on - operating equipment in a non-nominal mode perhaps.

QUERY Last night I understood you to say that the backup crew is looking at deploying a sunshield over the parasol. Is that correct and wouldn't that change the thermal characteristics terrifically inside?

WINDLER Well, no I don't think so. Of course the parasol is doing the job that it was designed to do. The sail is also designed to do a similar job. I think the shadows would overlap, so to speak, so I don't think it would make a big difference in the internal - -

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WINDLER - do a similar job, I think they would, you know, the shadows would overlap so to speak, so I don't think it would make a big difference in the internal temperatures. Now, we're - when I said the back-up crew was looking into it, they're just evaluating the - that interface, they're still, as we talked yesterday, they have - there's been no decision, of course, to deploy the sail. Now, but we are beginning, since there's only, I don't know, whatever it is, a week or some number of days until the EVA, we're trying to be sure that the procedures are set up to do what ever has to be done. And as you know, the crew requested a slightly different procedure there where they have asked if there would be any objection to Paul Weitz being one of the external EVA crewmen, and right now, we don't think that would be a problem, but we're still looking into that. That hasn't really been given a GO yet. And the thinking now is, of course, that the - they've all trained in the water tank to do the film transfer, the changing of the film, but they haven't all trained to do the sail deployment, and probably the obvious thing there would be to let Paul Weitz help do the film transfer, which has been suggested, I think, on the air to ground, and then trade crewmen, or at least trade the one that goes inside the airlock, and let then Kerwin and Conrad do the sail deployment.

QUERY You said, having Weitz be one of the external crewmen would be no problem.

WINDLER That's during this ATM film transfer, because they have all practiced doing it in the water tank previously in Huntsville as part of their standard training. They're cross-trained in that area.

QUERY Was there a problem today with S056?

WINDLER S056 is behaving in a slightly odd manner, and we don't really understand it. Apparently the - the instrument is being - the mode is being changed by some sort of interference. We thought it was due to the - when the S055 went to a certain mode, a mirror auto raster mode, and it was causing some sort of a little electromagnetic interference or whatever that changed the mode on the 56, but then it did the same thing, even after this 55 instrument was running. So that kind of indicates that perhaps there's something else making that interference - causing that interference, and we don't know exactly what it is, but you can cycle the switch and it will run okay, so we just have to be careful of it.

PAO Any other questions? I think we should explain. I'm sure Milton and I didn't mean anything deliberately when we mentioned the tornados. We weren't actually

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for tornados over at Dallas, or rather we were hoping for a chance to observe some severe weather. Thank you all very much.

WINDLER We're hoping to be fortunate enough to be able to look at them when they occur, but we don't want anybody to get a tornado.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 11, 1973
8:30 a.m. CDT

PARTICIPANT:

Neil B. Hutchinson, Flight Director
Milton E. Reim, Public Affairs Officer

SL-II PC40A/1
Time: 08:42 CDT, 18:13:42 GMT
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PAO Good morning, gentlemen. This is the overnight Change-of-Shift Briefing, with Neil Hutchinson Flight Director. We'lJ let Neil take it away.

HUTCHINSON All night Change-of-Shift Press Briefing. Uh, let's see, I had two or three things I wanted to talk about. One was, and I'm not sure where you guys - how you end up when you end up with the guys at night - last night, but we have another instrument in telescope that's broken. S052, this happened last night, right about at handover, between the two teams, which must have been in about 6:30 last night. We have done what little troubleshooting we could on it at the time the anomaly occurred. We really didn't do anything. We just looked at the camera and looked at the telemetry and it's fairly evident that we have a transporter jam in the 52 camera. And we have discontinued all 52 operations, film operations. Of course, you know, we have replaced that camera and the film and everything, when we go out EVA. We will be scheduling - if you remember, the 52 is the white light coronograph and we will be scheduling considerably more television, both real-time down-link and VTR of the white light coronograph to try and get some - what data we can out of the system. Of course, there's nothing wrong with the telescope. It's the camera that's goofy. And we're fairly certain that it's - it acted exactly like a film jam that the telemetry indicated the thing stopped framing and temperatures began to build up inside the camera indicating we had a stalled motor. S009 also appears to have malfunctioned, and we have told the crew this morning to - well, we haven't done it this morning. but we sent them a pad up last night - this afternoon about 18:00, they're going to open the S009 cassette manually and turn on the power and leave it that way. You heard part of the conversation here on the net, just a moment ago, about troubleshooting the habitationary vent valve. Basically what our desire is to do there is to find out whether indeed this 2-4 valve combination is a valid pressure seal or isn't. And the basic test is the cap he was talking about - the cap that he said he thought mistakenly was off, really wasn't mistakenly off, it was supposed to have been off. And that's the reason we fly with the cap off, is because, - that's our way to blow the cluster down if we ever have to bail out in a hurry in case of a fire. So, we have to have the cap off or the ground can't open the valves to blow - dump the cluster. Now, the troubleshooting procedure is very simple. We're going to have a crewman, and they're doing it right now - have a creman stand in front of the valve with a piece of paper. The ground's going to open the valve and he's

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going to see if the paper indicates air flow. Nothing very dramatic about that. And then when we verify we have air flow, we're going to close 2 and 4 and verify that we don't have any. And of course, you know, we've had telemetry indications all along that they're not working. And that's being done this morning. We are working on the primary coolant loop suit umbilical system this morning. And basically, as you know, when we ran the EVA to fix the wing, we had a problem with the suit umbilical system - not with the suit umbilical system - We had a problem with the primary coolant loop. And the problem basically was this, when we put the suit umbilical system on the primary loop, the sudden strong input of heat caused the TCV valve to go hardover, and it never recovered, it stayed hardover, jammed hardover. And as you know, a couple of days ago, we got the valve freed up and it's working nominally and now we're trying to figure out if we can bring the SUS loop on in a clever way so as not to cause the valve to go hardover and end up just like it was before; and that's what we're doing this morning. The test is a very simple one we've hooked up a third LCG, with the LSUs on suit umbilical system 1, which is on the primary coolant loop. And the crew is running a little kind of a heat integration test, you might say. We're going to turn the loop on for - I don't remember the exact numbers, but turn it on for 15 seconds and then turn it off, and then turn it on for 30 seconds, and turn it off, to try and introduce the heat load on airlock module coolant loop in gradual steps to see if we can keep the TCV valve from over reacting to an immediate input of heat. The obvious thing we're aiming at here is to learn how to bring a suit coolant loop for the next EVA, because we can't afford to get into the same jam we got into last time where that coolant loops went - went kind of bad on us when we were - when we were bringing up the suit umbilical system. So that's going on this morning. You'll recall many days ago, I don't remember how many, it's hard for me to get back in phase here, but several days ago, we had a problem trying to get CBRM number 6 offline, and we tried several times to get it offline, and as you know CBRMs 5 and 6 on the ATM power system. We - during the EREP passes, we continuely play with them to keep their state of charge up, because whenever you go out of solar inertial, they have a tendency to start going down because of the Sun incidence angle. CBRMs 5 and 6 and consequently we take them offlines so the batteries don't get too low. Yesterday and the day before, we couldn't get CBRM 6 off the line, and we have decided that we are not going to fool with CBRM 6 anymore, because we're afraid if we ever get it off the line we couldn't - we stood a chance of not getting it back online,

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so we have sent a message to the crew and we on the ground are no longer managing CBRM 6 and we're going to leave it on. It takes it a couple of revs to recover after ZLV, but it's really no problem. We've even taken the command on it, we're getting ready to take the command out of the ground system so we can't inadvertently send it. You recall we switched over to the secondary ATMDC computer - Not last night, but yesterday. And we have completed this morning all the patches on the secondary computer. So it's up to snuff right up to the primary, and it's running like a top, with no problems. And let me give you a little Flight Plan stuff. You're probably familar with today - today's Flight Plan is pretty straight forward. We're doing some of this troubleshooting this morning. We're running EREP 8, and I think you probably got, ya'll have EREP 8 data, where the take is and so on? Okay. Weather looks very good, again, incredible except for - well it turns out, a lot of the DTOs on EREP 8 across the states are weather DT - targets - weather sites and they've got some pretty good ones so I understand, to look at. But the weather's in good shape for EREP 8. While we're talking about EREP, EREP 9 tomorrow is across the northern United States. Chesapeake Bay, first time we shot Chesapeake Bay, weather looks outstanding; 36 sites on the EREP tomorrow. And I didn't get a little summary of all of the stuff we're looking at. (Cough) Excuse me. Tomorrow's Flight Plan looks pretty standard, no real problems building it last night in fact it went very smoothly. Somebody wanted to know a little bit about what we were doing with the crew's circadian. I'll make this as simple as possible, and I'm not sure that's possible. Day 165, 3 days from now, the crew will be gotten up on time. They'll work a 14-hour day. They'll go to bed 2 hours early, at 01:00 Zulu. They will have a 7-hour sleep, instead of the normal 8. They will get up 3 hours early, on Day 166 at 08:00 Zulu. They will work a 15-hour day, go to bed 2 hours early again, at 23:00 Zulu. On Day 167, they will get up 4 hours early, and as you can see, what we've done is over a period of 3 days phased them backwards 4 hours. So, when this is all over, they will be working a standard crew day, which starts at 07:00 Zulu, that's 2 A.M. in the morning, Houston time, for wakeup and work a standard 16-hour day at 23:00, which is 6 o'clock, Houston time. And we will remain on that schedule until the day before retrofire. And when we get closeer to that, I'll tell you about that, because that's - would just confuse the issue right now. But there's another shift. You really want to talk about retrofire? There's one more shift, yes, backwards. And it's 4 hours if you want to - 4 more. So, we basically changed their entire circadian 1 - sleep, 1 entire, 8-hour cycle, backwards. A net - -

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HUTCHINSON And that's all I have.

PAO All right, start with Bruce here.

QUERY What was the indications of trouble in the S009 - S009?

HUTCHINSON The package - I wasn't here when the trouble happened and I don't have a lot of details on it, Bruce. I understand the timing - the timing mechanism is not opening the package on time, basically. And though in lieu of not operating at all, they decided to open it and leave it open.

QUERY And when they do the vent valve troubleshooting today, will there be a drop in pressure?

HUTCHINSON No, they won't leave it open that long. That thing doesn't flow that much.

QUERY They've been doing a number of troubleshooting things up there. How much time are they losing everyday in just troubleshooting things that are hassling them up there?

HUTCHINSON Well, I don't call that lost time. I think it takes a certain amount of - certain amount of preventive maintenance. As you know, we schedule a lot of things in a Flight Plan. We're probably spending a couple or 3 hours a day doing things like this. However, most of it is scheduled - we're able to anticipate these things in advance, like all that stuff we're doing today was all built into the Flight Plan in the most optimum place at the most optimum time with the right crewman doing it. So it's - it's a long way from unorganized troubleshooting. It's really very fairly well organized. Frankly, I'm really surprised we're not doing more of it. I really think - you know when you consider all the things up there that we have a potential for - for having to go pay attention to instead of doing experiments, I think we've settled down to a pretty fair routine. So it's like a couple of hours a day, you know. And that - that's troubleshooting time. Now you know there is - there is, anyway, in a Flight Plan a few hours a day- not a few hours. I'm just looking here, maybe 1 - maybe 3 manhours total scheduled up for things like vacuum cleaning and changing filters, washing this off and bias sighting that and so on.

PAO Art.

QUERY Let's see. I guess a couple of things. I notice on the EREP passes that you all have stopped making alternate Flight Plans for if there is no EREP. And I wonder what the philosophy is there. Is it just everything is going so well that you don't have to worry about not doing an EREP anymore?

HUTCHINSON No, I think there's a couple of things there, Art. Number 1 is that, of course, we're - we're - we are behind on EREP. I don't know how many we're behind now. We're not behind very many though. We - we figured out a way to - I believe we're going to end up with 12 passes out of 14. I wish I would have brought a 7-day forecast with me. But, anyway, that's one consideration which makes you have a tendancy to really want to get the sites. Another consideration is the fact that the weather has been extremely cooperative. Where we've been shooting weather sites, we've had the bad weather to look at. Where we've been shooting ground sites, we've had good weather. The third thing, I think, is that if you've looked at any of these EREP data takes, you'll realize that geographically they're spread out something fierce. Now this one tomorrow - the reason I make this point about being spread out - hey, that's super, thank you - about being spread out, this one tomorrow that we're going to take is not spread out. It's very concentrated. Eighty five percent of it is right there around the Chesapeake Bay. And when a EREP pass is strung out over a long - a long flight - a long groundtrack - a long arc of groundtrack, you have a tendancy to - it's very hard for a weather system to really eat you up, you know. It can get little part here and a little part here and you might have 0.8 here and you lost a couple of sites here and so on so worth. But as far as wiping the EREP out totally, it's very hard to do. Now that's not the case tomorrow. We stand a chance of losing that EREP pass tomorrow if - on weather. And we did build an alternate Flight Plan for tomorrow. And - however, the weather looks remarkable up there, but there is a front on it's way across the northeastern United States. It's like 500 miles away; predicted to be 500 miles away tomorrow. I don't think it's going to cause anybody any trouble, but in a case like that we - we have planned an alternate.

QUERY Okay. The - the other thing is the - the failure - the film jam on S052. If you - you go out on the EVA and replace the film or the film and the camera too, or how does - how does that - how does that work?

HUTCHINSON The 52 is - is just like the 82A; when you replace it, you replace everything. And it's a standard procedure. The camera comes - the camera, film mag, the whole thing comes right out of there. So you get a new camera transport mechanism and camera every time.

PAO David Green.

QUERY Along on the same lines, Neil, does that mean you're not going to lose what you already have on S052?

HUTCHINSON That's correct.

QUERY So you will keep what you got?

HUTCHINSON Yes, sir. And we're losing time between

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now and when we - some amount of time. It depends on how much down-link TV we're going to be able to schedule, which isn't as good as the other anyway.

QUERY Could you talk a little bit about housekeeping. There were a few words this morning. There has been - How much time is being spent on housekeeping? Are they running into more time on that than planned? And you mentioned some places are just a terrible mess. Could you go into the details on that?

SPEAKER Well, I wouldn't say anything's a terrible mess. The place that Pete was specifically referring to in the conversation we heard here awhile ago was the area up in the dome right where you go through the OWS hatch. And you'll recall that right there right now we've got and have had for several days, a portable fan which is no small device. It's like this big around and that long, hanging on a rail, blowing air from the OWS up into the forward section. We also have running through there two complete umbilical systems, because we've got those two suits still down there in the workshop on water tank 1 connected to SUS loop 2, which are keeping artifically the heatload on the secondary coolant loop. Now, we aren't going to be able to take those out of there until we get ready to troubleshoot the secondary loop, which I suspect will be in the morning. And, of course, you just heard them given permission to get the fan out. I don't think they're - I think Pete's an extremely neat liver. He likes to have everything super shipshape. However, that one has to be really bothersome because they got to go through that hatch all the time. Everytime they go forward, and it's small anyway. Not small, but smaller then they're used to roaming around in. As far as the housekeeping goes, I think we're finding about the kind of amount of housekeeping that we expected. We end up spending, and I really ought to - without giving you any numbers here, I really ought to total it up. Basically, it ends up being an hour to an hour and a half per man, per day in housekeeping. Housekeeping is really what it says. It's keeping the house shipshape, not yourself, or cooking or anything like that. It's literally doing little things like vacuuming things, and wiping things, straightening stuff out, and stowing this, and etc. And each day when we go into the Flight Plan, we try and enter each execute day with 1 hour of free time in there for housekeeping that we can jump and use in the middle of the day for anything that comes up that we might want to use. And if we end up not using it, the crew will go to the shopping list and pick

SL-II PC40B/4
Time: 08:42 CDT
6/11/73

something to do. But, so what I'm telling you is one third of the amount we usually have scheduled is probably not used. Although we have been generally using it.

SPEAKER Bruce.

QUERY With - with everything coming down through that hatch, what if they needed to get out of there in a hurry, and in case a fire should close off that area? You know, that seems like it would be a little hard to do.

SPEAKER Well, the - of course, all that stuff terminates - That's right. You're correct as far as the OWS hatch goes. However, - and I can't - I'm not sure which hatch would close. I'd be certain that the hatch - In the first place, you can isolate the forward compartment from the aft. The forward section of the vehicle from the aft section of the vehicle with the forward hatch in the airlock. There's nothing in that way. The only thing that - -

END OF TAPE

SL-II PC40C/1
Time: 08:42 CDT
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HUTCHINSON I'd be certain that the hatch - In the first place, you can isolate the forward compartment from the aft - The forward section of the vehicle from the aft section of the vehicle with a forward hatch in the airlock. There's nothing in that way. The only thing that's in the way of the aft airlock hatch are the two suit umbilical systems. And that's one switch and two QDs. Bang, bang. Right there on the panel; right beside the hatch, which is a matter of seconds. And I don't think we closed the OWS hatch in an emergency jumpout.

QUERY You go to the forward hatch to close that, right?

QUERY Are there any plans for another medical briefing, and the results of the skin sample experiment, and so forth?

HUTCHINSON I don't know. I have to - I don't know at this point. We can check on it.

PAO Anymore questions? One more back here.

QUERY If you would, Neil, talk a little bit about - you mentioned troubleshooting - troubleshooting on II and how it could relate to III and IV as a time saver.

HUTCHINSON Well, most of the things - That's kind of hard to answer. Most of the things that we're doing, of course, obviously when something goes wrong in Skylab II, and we take the time to figure out what it was and what we can or can't do about it, we've obviously saved somebody else some time. We could well have saved ourselves, depending on what it is - in almost all instances, when we do troubleshooting, we essentially - we haven't been forced into it, but we - it's necessary to do it for a reason that undoubedly will affect something you'll do later on. Like this habitationary event thing - you know, whether you keep the cap on or keep the cap off. Or like the suit umbilical system - we were forced into doing that because we have to learn how to do it so we can do an EVA on day 26. And usually these things will end up in either modifying something that the crew is doing, which obviously ends up affecting Skylab III or Skylab IV. They'll do it however we end up learning how to do it here. So, I think in essence, they all end up saving time on the later missions, in reality.

PAO All right. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Shift Briefing
6/10/73

Change of shift Briefing
Johnson Space Center
June 10, 1973
6:33 p. m. CDT

PARTICIPANTS

Milton Windler, Flight Director
Dennis Williams, Public Affairs Officer

SL-II PC-39A/1
Time: 18:33 CDT
6/10/73

PAO All right, we'll begin with a brief status report from Mr. Windler.

WINDLER Okay, we had another, what I consider to be, a very good day. More like what we had hoped a typical Apollo day, I mean, typical Skylab day would be like. We did the EREP pass without any real problems. We did have a minor procedural error, in that the crew entered a transposed number into the computer. I think that the number was supposed to be like 5030 and they entered 5003, something like that. And that essentially gave us a 13 minute maneuver time, which caused a - from the time that we started the maneuver, which was designed for a 25 minute time - it caused the computer to go at a more rapid rate than we had planned. And we used a couple of hundred pounds, pound/seconds of TACS propellant. It also made our attitude system a degree or a couple of degrees off in attitude potentially so. We won't know that until we analyze the data. But, that's well within the specs the experiments are working to. So, that's no real problem either. We were concerned about that I guess mostly since it was the first time we had used this computer, we're on a secondary computer as you know. And it was the first time we had used it, and I guess our major concern is that there was some anomaly in it. But, it turned out to be any thing other than this transposition of numbers. The medical runs have gone well. The ATM folks have been looking at a large coronal streamer and you probably have been briefed on that. Apparently is is something fairly unusual for a prominence to go out as far as this one has gone. And they alerted the crew to that, and the crew looked at it. In fact even sent us just a few TV pictures of it. And it looked even impressive to a laymen like myself. Just as I was leaving the crew reported that the S052 camera wasn't working normally. And the ground had reported seeing a rise in temperature of about 3 degrees on this camera, which doesn't sound like a whole lot considering some of the temperature excursions we've gone through. But, the ATM instruments are designed to be stabilized to a very narrow temperature range. And so they really didn't think that they were temperature sensitive necessarily just to operate, but the data is somewhat degraded if they get out of their specs. And they are still looking at what data they have to try to find out more about the 52. So, I really can't tell you any more about it than what I've just said. People have asked about the circadian rhythm or the new hours that we're going to. And right now we plan to get this 4 hour change in the crew time by putting them to bed 2 hours early on day 165 and 2 hours on 166.

SL-II MC-39A/2
Time: 18:33 CDT
6/10/73

And because, well we'll get them up just 1 hour earlier on that first day and then the second day, we'll get them up 3 hours earlier. So on 166 they will be on sort of a normal cycle as far as operating their normal 8 hour rest etc. I hope I didn't transpose those numbers, but I believe I have given you the right days. And that's about where we are today. Oh, the AM coolant loop, let me mention something about that. We did turn on the primary loop and have run with that most all of the day. It seems to be working fine. We are planning now to turn on this loop, that coolant loop that was used by the crew during the EVA tomorrow in a fashion that will impose minimun thermal shock to the primary system, to establish if it's okay to use that system during the EVA. And also to further validate that the primary loop is controlling itself correctly. After that we'll probably try the same technique on the secondary loop that that was used on the primary loop of trying a 2 pump operation and try to hit it with a high pressure - -

END OF TAPE

WINDLER - we would probably try this same technique on the secondary loop that was used on the primary loop of trying the two-pump operation and try to hit it with the high pressure. And that's about where we are.

PAO I'd like to ask that you wait for the microphone, please.

PAO Self-operating.

QUERY I missed somewhere about the rhythm change - why the change of rhythm?

WINDLER This has to do with the fact that the crew launched at a different time, instead of launching at noon, they launched in the morning, and in order to make the entry work out right why we changed that by four hours - or it comes out to be four hours. So, we're trying to put them now as reasonably early as we can into the same cycle that they'll see on that day. And you're aware that - you know it's sort of a little bit unusual in this sense - they have a short sleep period before the entry day anyway. And it was also - we didn't do it sooner because of the desirability of flying - the - one of these ATM calibration rockets, and I've forgotten exactly what day - that's on 18 I believe it is. And so that's the reason that we're not doing it sooner.

QUERY Can you tell us the time of splash-down now?

WINDLER No, I can't. Do you - have you published that - I know it's available - I just don't know what it is.

PAO I think it's 8:48 or 50 Houston time. We had that question yesterday.

WINDLER Okay.

QUERY We got a hold of the proposed flight plan for the balance of the mission and it showed on day 26 the sunshade EVA - sunshade deployment EVA. I realize that's - that was clearly labeled proposed for flight plan, but is this in fact now, a firm plan or still under study, or what exactly is the status of that?

WINDLER No, it isn't and I was asked - did you ask me yesterday about the status of the testing? Do you know the answer to that yet? Okay. Yeah, I think I do today. It turns out that the - and I gave you - I'm glad you mentioned that because I told you probably some misleading information yesterday and went - in reviewing - personally reviewing the crew's transcripts - they didn't really say that the color was darker. They said it had changed and - perhaps you've read the words - or they've been exposed to you - but they did say it had changed somewhat - I believe they described it as being flatter, but that it really hasn't changed a great deal from the original orange color that it was. It just - apparently appeared to be the same color but that - I would

SL-II PC-39B/2
Time: 18:33 CDT
6/10/73

say that the texture or something like that was a little bit different. And the initial conclusion from that is that probably the parasol is not degrading as much as the material in the accelerated solar tests. And I believe that those are up to about 500 Sun hours, which an hour of course is about the same as - approximately the same as a revolution that we're going through now. We're an hour in the Sun and 30 minutes in the night, so that would correspond to about 500 revs and we're approximately 250 now, I think on the material. Now, this is just preliminary and I think by next week they expect to have the tests done - or later on this week if you count today as the first day of the week. So, right now the preliminary conclusions are that we probably don't have a problem getting to the end of Skylab 2. However of course, you realize we have to evualuate it on until Skylab 3 gets there and so that's the next point - milestone that we have to get to and that's still being evaluated - the tests still continue. And I was told what day they would finish them - seemed like to me it's Tuesday or Wednesday or something like that. Then of course, the report is to be made and I think it's along about the middle of the week that a decision is to be made on what - whether to deploy that sail or not. And the backup crew do plan to lolook at that deployment as it relates to being installed over top of the parasol, which of course they have not - the crew had not - Conrad had not practiced on. But nobody really thinks that's going to be a big problem, but it is something that needs to be looked at.

QUERY Are you preparing to send - -

END OF TAPE

SL-II PC-39C/1
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6/10/73

WINDLER - practiced on. But nobody really thinks it's going to be a big problem, but it is something that needs to be looked at.

QUERY Are you preparing to send some other kind of material up with the next crew?

WINDLER I'm sure that thought is being given to that - likewise I've not heard of any definite plans. Obviously I think you'd want to wait until you - until the crew left Skylab 2 before we made any decision like that and we'll have some what we hope to be very good pictures of it as the crew does the fly-around maneuver at the end of Skylab 2.

QUERY Could you give us a run-down on problems with experiments right now. I understand this afternoon the S009 - Weitz was having some trouble with it - he used the word sick.

WINDLER Well, I guess there's really no good way that I can - I can try to recall as many of them as I can but it surely won't be complete. Now the 009 experiment has failed to close. It's the one that flip-flops open and closed at certain points in the orbit. The - we did leave it in the flight plan for tomorrow with the understanding that we might want to do some trouble-shooting on it. However, they have gotten a considerable amount of data from it already and in fact their present thinking is that we probably - we'd want to not spend much time fooling with that experiment, but instead use the time to do other corollary-type experiments. I think - don't believe anything is - except for this 52 camera on the ATM is the only malfunction that's open there. There've been a few cases where some switch activitations have probably not taken hold and it's a sort of a pulse network in there that accepts the switch motion and maybe sometimes it doesn't accept it and they have to repeat the switch action, but it seems to always take the second time around. The ZREP is operating fine and the two passes yesterday and today - it's cooled down and all the READY lights have come on. One of the - course the mass measurement devices has been inoperative as you know from the beginning - the second one seems to be okay and I don't think - I'm trying to think about the medical world - I'm not - don't remember anything happening there. You might jog my memory if you've heard some phrases. I don't know of anything. We're right now preparing a status of the science and an update on the hardware but it was mostly oriented - the one we had was oriented towards the systems - spacecraft systems. And we're going to try and get out tomorrow a sort of a science resume to the crew update of where we are.

QUERY Do you expect to get any of the manufacturing

SL-II PC-390/2
Time: 16:33 CDT
6/10/73

experiments done between now and the end of the mission?

WINDLER Let's see that's 551 isn't it? Is that right?

WINDLER Yeah, but I've forgotten it now - I think we are going to try to do that. The crew is - has expressed some capability - in fact the corollary officer and myself were talking about that today in that we have a hard time scheduling the corollary experiments because they are a little bit difficult to fit into the flight plan and in view of the fact that the crew have said certain things take extra time and they'd like to have us not press them right up to a time critical thing, but yet on the other - so we haven't scheduled those. But on the other hand it's also been obvious from the crew comments that they have been able to go into the shopping list of experiments and try to - and do experiments that we've been unable to schedule - the 487 that they did yesterday, for example. So, the thinking is, in fact we sent them a message tonight asking them if they could - if we could get started on a couple of corollary experiments if they could carry on the continuing runs. So I think that there is some prospects of being able to get these additional corollary runs in on that basis - that seems to be quite promising and it'd be hard to say really just which ones we'll be able to do. As you know, generally speaking, the medical have the higher priority and it is somewhat difficult for corollary experiments to get on the schedule. But we think the crew can do that and we're hoping that they will agree to our proposal.

QUERY Conrad had asked - -

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SL-II PC-39D/1
Time: 18:31 CDT
6/10/73

WINDLER - - corollary experiments to get on a schedule. But, we think that the crew can do that, and we're hoping that they will agree to our proposal.

QUERY Conrad had asked earlier for some sort of flight procedure on the batteries in the Apollo command module finally die. Has he been given any procedure? And just how much power will that require? And will it effect Skylab much.

WINDLER Well, the procedures are already on board. There is a question of exactly when you will implement them. We had discussed previously the advisability of doing a practice power switch over. Right now we don't think we need to do that, it's a fairly simple procedure. And it really doesn't seem to be worth the time it takes to implement it before we really need to. And I think we, right now, we think that we'll let the fuel cells just go ahead and run dry more or less, which was pretty well the original procedure. It will affect our power consumption or capability I guess is the way to say it to you. Apollo is providing around a thousand watts now. And we will need to supply that power to the Apollo when its fuel cells run out. So, it will reduce our experiment capability by about a thousand watts. And if we continue to do these long EREP passes we feel pretty sure that we will have to power down the spacecraft somewhat. Now we can get 500 watts by just powering down a wall heater in the docking adaptor. And although we have been doing that but on the other hand we had not come any where close to our redlines on the power system either. So, we have right now a good margin. But, if we had to make up a thousand watts we will have to go to some sort of a power down mode. And I think that was the intent of his question. He wanted to know I think if we would have to power down and if I guess exactly how we plan to let the fuel cells run out. And I forgot now whether we answered that in the air or whether we sent him a message or whether we're going to send him a message. We said some things to him, I think, on the air. I know I talked about it with the Capcom. But, I forgotten now whether he spoke that on the air waves or whether we decided to wait and send it up with the evening messages.

QUERY Can you give us a firm date on when the fuel cells are going to dry up?

WINDLER Well, the day is 1 mission day 166, and I've forgotten the exact time. It's probably slightly - - I think that was put out by the PAO officer some time today. At least he asked me what the number was and he acted like he was saying it on his loop. So, I guess he did.

SL-II PC-39D/2
Time: 18:33 CDT
6/10/73

QUERY Back in the commentary after the solar wing was deployed someone, Conrad I think, made a comment that now they had hot water and they had - - Were they doing without hot water up until that point, all the time they - -?

WINDLER No, well they had hot water in the food compartment of course, in fact he commented on how well it reconstituted the food, and how hot it was. So, he was having, you know, hot water to mix in his food bags. And the first time they were scheduled to shower they turned the hot water heater on, and had a hot shower. But, in between then they did turn it off. And I guess his sponge baths or whatever you want to call them, have been with cold water. So, that's why he made that comment. Also I think they were concerned because they were scheduled to get a shower pretty quickly after their EVA early the next morning. And I think they were afraid that with the attitude that we were in and the particular - before the wings actually deployed they were concerned that maybe we wouldn't be able to turn the heater back on, which I don't blame them. I'd be glad to hear that word too.

QUERY Can you give us some good words on the EREP tomorrow?

WINDLER You know, I was thinking as I walked over here and trying to - I looked at where the paths went today and I forgot completely to look at where it's going tomorrow. So, I really can't. One of ya'll probably knows in fact, tell him.

SPEAKER We'll give you a report a little later.

QUERY Are the temperatures level again? They had gone up just a little bit the last couple of days.

WINDLER Which temperatures are you referring to?

QUERY In the workshop.

WINDLER Well, I really haven't paid any attention to the temperatures. They are no problem. In fact, you know we've still got this suit liquid cool - -

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SL-II PC-39E/1
Time: 18:33 CDT
6/10/73

WINDLER Well, I really haven't paid any attention to the temperatures. They're no problem - in fact you know we still got this suit, the liquid cool garment wrapped around the hot water heater to put some heat into the coolant loop. Generally speaking, the crew is - I guess you're talking about being on the low side. I think they've felt like they've been cool if anything. That's the comments that I've been exposed to. And I've forgotten exactly what days that made that on - I remember reading that just in one of the air-to-ground transcripts just a few minutes ago but it may have been a couple of days old. You know yesterday I was going to tell y'all about that pass that went over Paragould, Arkansas and all of that and then I forgot to do that, but - Piggott - they went over Piggott, Paragoul too, but anyway - today you probably already know where it went. But I forgot to look at tomorrow's.

PAO Are there any other questions?

PAO Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 9, 1973
6:44 p.m. CDT

Participants:

Milton Windler, Flight Director
Dennis Williams, PAO

SL-II PC-38A-1
Time: 18:44
6/9/73

PAO Okay, we can begin. We're going to have a brief status report, and then we're going to have questions.

WINDLER Well, I have to say today was an excellent day. Several good things happened and, far as I know, not any bad things. We did a real long EREP pass, one that was done like the system was designed to do. In fact, today, you'd have to say the Skylab behaved very well and it did the things in the manner that we expected it to all around. All the experiment runs worked out well, I don't believe there were any problems, at least not any that I know of right now. The power system worked very well, had no problems at all with the supporting the EREP pass. We did turn on the primary coolant loop, which you're probably well aware today. Last night they turned it on for a short while with one pump flowing and it cooled off - the valve stayed in the cold position - it cooled off rapidly. Today we turned it on with two pumps operating, and the difference there, of course being the increased head pressure or pressure in the line, and apparently this was enough to open the valve. Since the pressure - the way the valve is arranged - the pressure tends to make it go from the cold to the hot position and that seemed to have worked and it modulated very well for the three or so minutes that we had it on at Goldstone. And then the next time we had an opportunity, we turned it on with just one pump operation and it worked okay in that situation also. So we are feeling pretty good about the primary coolant loop and want to decide just how to bring it up and to let it run for several hours and get some confidence in it and then we'll try to do a similar thing with the secondary loop. Get the suit umbilical system pumps off, etc. Somebody asked a question about the flare that was transmitted to the crew this morning. It really wasn't a flare, it was a, what they call a sub-flare, and I can't recall exactly where the dividing line is. It's kind of like, I think, between a hurricane and a tropical disturbance. It probably depends on where you are, how high you are above mean sea level or something like that. But in any event it was - the intent there was to alert to a fact that one of the active regions on the Sun was showing signs of activity, and in fact this was a small sub-flare that had actually occurred and it actually diminished by the time we had passed that information to the crew. But there was some thought that they might get a - if it was more active, it might trigger the alert on the console. And we just wanted to make them aware of this because the crew has been interested in solar weather conditions and in fact, you'll probably recall, we sent information up to them

SL-II PC-38A-2
Time: 18:44 CDT
6/9/73

concerning this activity long before they were able to actually do the science work. So, they have asked us to tell them as best we can those things that are likely to be of interest to them and to the scientific community and they'll try to do what they can to observe them, but I don't think actually - it didn't wind up triggering the alarm. In fact, I think that region is actually beginning to diminish in intensity now as it moves across the face of the Sun, although there were some promising regions that are just now beginning to emerge, and they'll be looking at those in the next few hours, I think, to see what they did while they were on the back side of the Sun. And that's, I think, about where we are today. We did medical runs, you saw that on TV probably, and it was basically a full experiment day.

PAO Please wait for the microphone for your questions if you have any.

QUERY It was mentioned earlier that - I think it was yesterday that there was going to be a change in the Circadian (garble) rhythm in the day-night cycle of the crew to the get them in shape for the new splashdown time. Have you got any plans set on that, and if so, what are they.

WINDLER No, we really don't have any set. We want to do it at the most - at the earliest convenient time, I guess is the way to say it, and we working - we already have summary flight plan for day 161 built. And we're on day 160 now, so that would be like tomorrow. There's a possibility that we could include it the day after that, and we may do that. And that will happen on the shift tonight from midnight on. It really is a little bit of a toss-up as to what might be more convenient for the crew and ground people, and that sort of thing. We really don't have to get into that mode until later on in the week to support the EVA and the entry. It's about a four hour shift is what we're looking at, things moved up earlier by 4 hours.

QUERY There will only be one four-hour shift. Is that what you're saying?

WINDLER That's the way we're thinking about it now. You mean as opposed to say, taking two separate days and moving two hours on each day. Yeah, we're thinking that it probably would be the best to just jump - plunge right into it. But, the exact day to do that - there's really - still subject to discussion.

QUERY Milt, would you probably put them to bed a little early, and get them up, you know, just cut their sleep period that night, is that the way?

WINDLER We'd like to try to do that. That's another reason we have to really wait until - -

END OF TAPE

SL-II PC-38B/1
Time: 18:44 CDT
6/9/73

QUERY - - probably put them to bed a little early and get them - you know just cut their sleep period that night is that the way?

SPEAKER We'd like to try to do that. And that's another reason we have to really wait until we can, you know manage both ends of the cycle, because the way things stand right now we have them filled up for day 161, of course.

QUERY Had you not gotten the primary loop back say on this flight, and you continued in that secondary problem, with everything stretched out and all. How much a hastle is that really for the crew, or do you think it is for the crew with all the lines stretched out every where?

SPEAKER I don't think it's any - you mean it just a configuration we're in now. I, they haven't complained about it. Of course, they indicated they had just as soon get it secured and put away. I think basically Pete is - has flown of course on several flights and he knows now that housekeeping can get away from you if you don't stay really up with it. And I think he just likes to keep everything tidy and stay ahead of that kind of activity. But, they haven't indicated, that I can tell any way, that's really bothering them any. So, I don't think it is. It would be undesirable of course to keep it in the mode we're in. We'd certainly be glad to get back in a normal configuration.

QUERY How is the housekeeping going?

SPEAKER I think, from what we can tell, it's going very well. They indicated yesterday that they actually had some time, extra time available, which indicates to me any way that they are, you know they have done all the picking up and straightening up. Of course there are some things that they can't do yet. The suits are still drying for example and that takes several hours. And you just have to wait until you get an opportunity to put some of that stuff away. Today I think Paul Weitz indicated he was up a little bit early. And so I really think they are probably staying up with it very well.

QUERY How about the greasy film on the window. Have they solved that problem?

SPEAKER Well they, I don't think they ever said much about it. We gave them a way to clean them off, and I'm sure they did. I haven't heard them reply to that. They may have while I haven't been here, I haven't reviewed it. It really isn't exactly a problem I don't think. It's kind of like dirt on your windshield, you'd like for it not to be there sometimes, but you certainly can drive with it.

SL-II PC-38B/2
Time: 18:44 CDT
6/8/73

QUERY What's the status on the study of degradation, possible degradation of the parasol, and the possibility of a twin fold deployment?

SPEAKER Well, it's - I think I indicated to you before that the, that that decision is probably not going to be made until later on this week, or whatever you want to call the week coming up. The crew did report that it had changed color from - it wasn't the same color that it was when they put it out. And that's really about all I know about it right now.

QUERY I'm sorry I didn't make myself clear. I'm referring to the studies of the artificial aging process going on at Huntsville. Have you got any updates on that?

SPEAKER No, I don't.

PAO Are there any questions? Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 9, 1973
9 a.m. CDT

Participants:

Charles R. Lewis, Flight Director
John E. Riley, PAO

Shift Briefing
6/9/73

SL-II PC-37A/1
Time: 09:04 CDT, 16:14:04 GMT
6/9/73

PAO Want to give us a summary of your shift, Chuck?

LEWIS Okay. With regard to the power system. We've got the AM power system and the CBRM or the ATM power system now about sharing the total load equally. That's about 24 to 25 hundred watts from each source for a total average load, now of about 5000 watts. There's essentially no change in the coolant loop status. And that is in work for troubleshooting procedures. They did try yesterday, they turned on the primary coolant loop to see if possibly a flow would break ice, if there is ice, away from the control valve that appears to be stuck in the cold position, with no success. The loop temperature dropped very quickly and we shut it off again. We initiated yesterday, some memory uplink - uplinks to the primary ATM DC computer. That was completed this morning. A little later we intend to switch from the primary to the secondary computer. And then subsequently we'll perform the same memory uplinks to the secondary computer and essentially have both of them with the same capability. And that's about it as far as any change in status.

PAO Arthur Hill.

QUERY Mr. Lewis, could you go into a little more detail on the coolant loop and what you've been trying to do since Thursday night, I guess, it was?

LEWIS As I said, the only thing we've tried with the system itself is the one I described. We turned the primary loop on to see if flow would more or less slug any ice, knock any ice out of the TCV - B valve that is stuck in the cold position, with no success. Now during the day, yesterday, Marshall and their Contractors convened to discuss this thing. They have gone back and examined the test history on these particular valves. They've never had this type problem, even though we've got two of them, it appears right now, on the vehicle. There's no test history data that indicates a problem. There's - I might say also, that we did get most of the data retrieved during yesterday, and in the evening we started plotting various temperatures in the SUS loop, the coolant loop, flow rates, and that type thing. And the only thing that I've seen this morning as far as a - the output of that is that it appeared that the SUS loop was warm, very warm. And when we turned on the primary coolant loop, the fact that the liquid coming into this particular valve, TCVB, was warm. It sensed the warm fluid coming in, it says I want cold fluid. And when it went to give it cold, that's when it stuck, at that point. All the data shows it, that. That's very - Now events subsequent to that I haven't seen, you know, plotted. And we still have no

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explaination for why it has done that. That's the kind of thing that was done in testing, with no problem. And there's a meeting, again, this morning at about 10:30, with some of the Marshall people and our people, to review that data, discuss it, and see if they might come up with any kind of conclusion as to what might have caused it. I could be contaminants I suppose, but nobody's sure.

QUERY Well, if it's ice, haven't you - What you've done so far should have melted the ice, shouldn't it?

LEWIS No, no. If you remember yesterday, we told you the primary loop's been shutdown. And it - As a matter of fact, during the EVA it had gotten so - - it - it - The the temperature had droped very quickly on it, I think was down to - I think Sy Liebergot mentioned 10 degrees. I think it dipped as low as 10 degrees. Okay. We shut it off immediately. Now. And then we went to the secondary loop. And the secondary loop appears to have the same type of problem, but the valve, the same valve did not stick as hard over as the primary system did. So we are getting 40, 42 degrees temperature out of that valve. It should be up around 47. But it hasn't changed any, since we talked about it yesterday.

QUERY I hate to bring it up Chuck, but forgive me one more time. But I don't really understand. If the coolant isn't - the coolant isn't freezing, is it that the valves are not set up to accept that cold a fluid, or - -

LEWIS The valves will not move regardless. The valve is - The problem is the valve is stuck in a position. It's not modulating, to let warmer liquid in the loop warm the loop. It's accepting the cold fluid. In other words, the valve should move back and forth when it senses a temperature, and it should modulate to let cold and warm - mix it, so that you've got 47 degrees going out of that particular valve. It's not doing that. It's stuck in one position. And in the secondary loop, that position gives us about 40 to 42 degrees Fahrenheit in the coolant coming out of that valve. It won't change. Now the primary loop has failed - failed - maybe failed to the same type of failure mode, except it appeared to have stuck in a position even colder.

QUERY Well, it sounds like you've got a valve problem instead of a temperature problem, is that right?

LEWIS Well. The valve problem is what's causing the temperature problem.

QUERY Well I mean a mechanical problem as ap -

LEWIS Yes.

QUERY - - as opposed to a temperature temperature problem?

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LEWIS It appears like it. If we could get the valve operating properly, then the loop would come back to the proper temperature.

QUERY And what if it doesn't correct itself?

LEWIS I think we mentioned yesterday, one of the considerations is the EVA. We might possibly have to go to a purge flow operation on the EVA as opposed to the liquid cooled garments. That's one of - We can operate the way we are on the secondary loop. We have been the last couple of days, with regard to the systems. The primary loop, I don't think we'd want to go back to it in its present condition.

PAO Art.

QUERY Okay. Can you get to these ah - Where are these valves? Are they in the guts of the vehicle some place, and the astronauts couldn't get to them to do something?

LEWIS They're external - That's the first thing I thought of. Usually, at home, when I've got a gas valve or something stuck, I take a hammer and hit it a couple of licks. And I've had pretty good success, at least 50 50, most of the time. I asked that question last night. They're both external to the vehicle, and I don't know the exact location. But I've asked that for the EGIL people. I didn't get the answer back Would they be accessible to a crewmen on an EVA?

QUERY The second thing is, is there anything internal in the vehicle, say that they could somehow create a hot spot in a particular place that might encourage anything?

LEWIS I asked that question last night. I asked if we had any strip heaters, portable type strip heaters, on board. There's none. We have the high intensity lights, but they don't really put out enough heat, I don't think, to give us much.

PAO Okay. We have several questions from listeners. (Laughter) These all come from the Cape, I think. And I'm not sure that you'll know the answers to all of these Chuck, but I'll go through them. What affect will the cooling system problem have on the next two missions if we can't do anything more with it?

LEWIS I really don't know other than the EVA. The thing that concerns me, and I don't think we've looked that far ahead, is the deactivation for this mission, since we do power down some of the equipment that's on the loop now. I really don't know. I don't think we've looked at that - that far ahead yet.

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QUERY Okay, what is the latest on the sun shade study; is it deteriorating; and do we have to put up a new one?

SPEAKER Well, I know that they're running a test here or at Marshall on the material accelerated aging test and I think today that we're going to ask the crew in particular, if they could relate the color of the parasol to something inside the vehicle to get a more precise idea of what the color is. And that's all I've seen on it.

SPEAKER (garble)

SPEAKER It's still pos - possibility we may have to deploy one of the other sails before this crew leaves.

QUERY But as of now the parasol is still functioning and the temperatures are steady.

SPEAKER Yes.

QUERY Okay, and the next one, what is the temperature of the orbital workshop?

SPEAKER The average gas temp in the workshop is about between 74 and 75 degrees. The food and film temp; right at 79 degrees. That hasn't really changed much over the last 3 or 4 days.

QUERY And the last one. When is Kerwin scheduled to do more lab work?

SPEAKER Well, they're all - I don't quite understand that question. They're all doing lab work. We've got the EREP pass this morning, let's see, Kerwin performs the Earth terrain camera operation on that.

QUERY Probably - it probably - -

SPEAKER Oh, I think Kerwin had a run yesterday. I think they had a run on Kerwin yesterday. I don't have the flight plan here.

QUERY Yeah. He's the observer today, I think, on the Conrad run.

SPEAKER Pardon?

QUERY That's today. I think they had a run on Kerwin yesterday, but I'm not certain.

SPEAKER I think the question's probably related Doug like Jim said to - maybe to the - the blood - where he's - where he's doing the blood stuff.

SPEAKER I don't know. I don't show it on the flight plan for - for tomorrow. They may well be doing that this morning, I'm not sure. I don't have the flight plan.

QUERY Yeah, I didn't - I didn't see it listed on the flight plan.

SPEAKER I'm sure we will be doing - he will be doing some more of that kind of work.

SPEAKER Yes.

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SPEAKER But in the flight planning we're doing it day by day, it's hard to tell I guess ahead of time.

SPEAKER Arthur.

QUERY To get back to the coolant loop; is there anything - any procedure analogous to beating on the valve that could be done in an EVA. Is it reachable by EVA procedures?

SPEAKER Well, that's what I said, I'd asked that question this morning myself and I hadn't gotten the answer back. I know they're external to the vehicle, but I don't know whether or not they're accessible to the crew on an EVA.

SPEAKER Jim.

QUERY What is it about deactivation that is bugging you?

SPEAKER Well, the only thing I'm concerned about there is that if we take some of the equipment we have up now on the coolant loops, we would remove some of the heat we're putting into the loop. And it's modulating cold now. I'm just - My - my concern would be that it would be even cooler.

SPEAKER Yes.

QUERY For that matter when you have to start pumping power into the - into the CSM, would that reduce the number of things you can have turned on for the coolant loop to cool and therefore it would get colder?

SPEAKER No, I don't think it has any - would have any effect on it. In other words, all we do to put power into the command service module is hook up an interface umbilical and transfer power out of the workshop over to command service module. It really wouldn't affect the coolant loop.

SPEAKER Thank you.

SPEAKER I might be able to get an answer on that if I knew more precisely what the question was with regard to Kerwin. I might be able to go back and provide an answer, but I'm not sure I understand what they would like to know.

SPEAKER Okay.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 8, 1973
6:51 p.m. CDT

Participants:

Milton Windler, Flight Director
Bob Gordon, PAO

SL-II PC-36A-1
Time: 18:51 CDT
6/7/73

PAO Okay, gentlemen, we're ready with Milton Windler, Flight Director for the Maroon Team. Milt.

WINDLER Okay, well today was a relatively relaxed day, as you may well know. The crew did get up a little bit early, I mean, I shouldn't say it that way. We had them scheduled for a 2 hour extra sleep period and they got up a little bit earlier than that, so they spent most of the day, not most, but some of the day doing their clean-up activities. There was a medical run and essentially, I get the impression, and from what they say, that they actually had the spacecraft in pretty good shape. The power system is performing very well, both of the units, we're still looking at the coolant loop anomalies that we've had, and the secondary loop is operating okay. It's regulating a little bit colder than we'd like, however, it is performing all right. The primary loop, we have not put on since yesterday, during the EVA, and we don't plan to put it on until we come up with a good plan of what's the best thing to do and also what courses of action to take, given several responses from the system, and that's been in work all day, between KSC and Marshall, in fact, they have had two or three fairly long conferences on it, telephone type conferences, and something may be done about it this evening. I would guess it probably would be tomorrow, but there's a possibility something might happen, they might try a procedure tonight, and that's about where we are. Tomorrow is going to be another day of experiments,planned medical run - crew - an EREP run, and activities like that. I guess I'll answer questions that you might have. Okay.

QUERY Have you determined what was wrong with the primary coolant loop yet?

WINDLER Well, the apparent problem is that's it's temperature control valve is apparently in the full cold position. Now, why that is, we don't know. And we've spent most of the day trying to get the data assembled, of ourse, as you recognize, most of this happened while we weren't watching the spacecraft, so we spent most of the day getting the data from the data retreival system, and have begun to analyze that in some detail now.

QUERY What about the power situation, Milt, the eight batteries and how many more watts they have, and what about the ATM batteries. Is there still a chance you might loose some of those?

WINDLER The ATM batteries are - appear to be in very good shape, as you recall, we don't have any real good intermediate status indication on the batteries. We know we charge them fully every rev. They've - the depth

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of this charge has been somewhat less than 20 percent, which is - you recall, we were down around 30 percent when we were operating with a single system. So we are up around 17 or 18 percent, which is very good. The only real good indication that we have on the real state of charge of the battery is if we were to discharge it down to the low voltage and see where it tripped off the line, and we of course don't intend to do that any more, so we don't have any good how goes it on that. And the best we can tell, though, they're working fine. The AM batteries are doing well, they've all been charging fully and there for a while they were putting out around 2700 watts and it's been dropped back now, I believe it's perhaps around 2400, I think that's what the current level is.

QUERY What are you going to look at tomorrow on the EREP pass?

WINDLER Well, the pass starts somewhere around in Washington state, and runs down across the United States, and ends up or could end up on the Northern Northeastern part of South America. Guana, is that place up in there? I've forgotten the names of those, just north of Brazil anyway. And we are still trying to evaluate the power system and the geometry of the passes to determine exactly when we will be ablt to take the data, so it may not include that whole pass as a data taking operation.

QUERY Can you be specific about what you'll be looking at on the ground?

WINDLER The sites, you mean?

QUERY The sites, right.

WINDLER No, I sure can't. There's 20 some of them, and I don't remember what they are. You're looking for major cities or something that, or you want more - you mean like numbers 472, 685, specific - no, I'm sure it covers all, the whole spectrum, but I don't know, well, I wouldn't know the exact sites.

PAO We can give you the numbers, and you get a book out there, Earty Resources book out there. Just match the numbers up and you can pick out what sites we're going to look in.

QUERY This gonna be your first full pass, Milt? This EREP pass. First one that takes the whole, you know, goes the whole way --

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QUERY Is this going to be a first full pass now? This EREP pass? First one that takes the whole, you know, goes the whole way and cuts the whole swath with the whole 120 degree angle?

WINDLER I'm trying to recall if we - it seems like to me the first pass was a long one wasn't it? But since then we have not done any long ones and they've been restricted to be in the Earth's solar noon. Now, as I say, now we may have when we get the power evaluation, we may choose to shorten this one up some, but it is anymore - it's oriented more towards the ground requirements you might say than it is the power requirements. So, it's - it is more flexible as far as the opportunity for looking at the ground is concerned.

QUERY Earlier today there was a conversation between Conrad and Mission Control concerning the EVAs toward the end of the mission - the possibility - in addition to having the film retrieval - have a sail deployment. Has there been any more discussion in Mission Control about that? Is there something being seriously studied?

WINDLER Well, yes it is as you're, sure, I'm very much aware there's some concern for the exact state of the parasol and that was the reason for trying to spend some time looking at the parasol and evaluating the condition of it - mainly to color. The - so we're trying to continue an analysis of that and of course if something looks like it might - if it - if the condition looks like it might warrant it why we would put up the MSFC sail, the Marshall sail. And that's what the crew was indicating - the question of course to them was whether they thought they could do that and the film retrieval on the same EVA and they essentially felt like they could - they'd probably take a break in the middle and have a little snack and go back in the airlock.

QUERY At this moment, though, there's no indication that there's any deterioration of the parasol is there?

WINDLER That's true. There isn't, but this is just one of the possibilities and there's several days left to make the decision and that will be discussed and that will probably be about the middle of next week I believe when you really need to decide on that.

QUERY The Sun tests at Marshall on that sail - are they complete yet?

WINDLER I don't know.

PAO Okay. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Science Status Briefing
Johnson Space Center
June 8, 1973
4:24 p.m. CDT

Participants:

Dr. Robert Parker, Astronaut Scientist
Bill Nelson, ATM Office, MSFC
Bob Gordon, PAO

SL-II PC-35A/1
Time: 16:24 CDT
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PAO Okay, this is Greenwich mean time. We're ready to start with Dr. Robert Parker on your left, Skylab Mission Scientist, and Bill Nelson of the Marshall Space Flight Center, Apollo Telescope Mount Office. We'll start with Dr. Parker.

PARKER Okay, I guess the first thing I'd like to do is talk with a brief status of how things are going, and where we are. It's a little ironic, tonight at 9:00 we're supposed to have a meeting with the two Program Officers and myself to try to decide exactly what we're going to do for the rest of the mission in terms of rescheduling things now that the wing is out and all those good things. I'll give you a status, perhaps guessing at some of the things we'll decide there. And also obviously we can talk about what's happened in the past. Yesterday, I believe, you people had a, was it yesterday that we had the medical briefing, or day before yesterday? Okay, so I won't dwell too much on that. I believe you have also heard from the ATM people in the past, but I'll also let Bill talk about that. I would like to say a few things about the Earth Resources people and the corollary experiments. In particular, let me point out that although the wing is fixed and we've settled the power problem, the power problem primarily affected one experiment, and that was EREP, because of the extra power drain of EREP in going out of solar inertial. Which is essentially saying that Earth Resources cost us not only power to run the experiment, it also cost us generating capability by not being in solar inertial, and not being as efficeint at collecting energy. Therefor the Earth Resources people can look forward to a really a much improved mission over what they had before, more so than any of the other experiments. Apollo Telescope Mount people lost a few, but not a major amount of their experiment runs. The Earth Resources people to date have obtained either 4 or 5, my figures leave me at the moment, but either 4 or 5 passes across the United States. They are currently scheduled for one more tomorrow. I really am not in a position to sit down and discuss exactly which sights were obtained on any which day. I do know the one tomorrow is scheduled to go over St. Louis and Atlanta. And one of the early ones went over White Sands and near El Paso. Another one went down, came in across, in fact you played that up quite a bit. It came in across San Francisco and went down across Mexico, and that's the time we discovered oil fields or we thought we discovered oil fields and gold in Mexico, that the Mexicans didn't want us to discover. But that indeed is the business of EREP. And it's continuing on a broad front. Any time we make a pass, we're satisfying any where between 15 and 35 principle investigators. And it is clearly impossible on it to beg off. If Dr. Willmart comes, maybe he can address some particular ones for you, but I have to beg off and try to discuss each one of those 15 or 20 principle investigator experiments. On corollary experiments these are the ones you very seldom hear about because most of them are not as big news as many of the other experiments. A lot of them have been running along very quietly, and you've heard even less about them than the other ones. We've been measuring radiation in the spacecraft. We've been making qualitative comments and quantitative measures about the habitability of the workshop, acoustic levels, crew comments about the way things are arranged and things like this which are very much aimed at future space stations. We've been doing that, we've been trying to study the way crew activities and maintenance work. The operational things are done, this is again with movies. And post mission we'll be able to compare the way in which these are done early in the mission and the way in which they are being done now to see how well man adapts and learns to use zero g. We've got a couple of, we got one student experiment, ED76 on neutrons, which has been running probably since day 3 or 4 and it just sits there and collects. You've got an S009, which is a cosmic ray emulsion package which again has been running since day 4 or 5. And it just sits there and collects particles or collects tracks from the cosmic rays. And that doesn't make a lot of news, and even today is not very exciting news. The results might be exciting, but we won't know that until the results come. We've been measuring things to do with the internal environment of the spacecraft in another 1 or 2 particular corollary experiments. But again, none of those are, are things that you hear about on a day to day basis, because they go on more or less routinely. There have been two, I believe. I have to keep this list in front of me so I don't offend any particular corollary PI, because there are at least a dozen we're planning on doing this mission. But, there are two in particular that we've been spending a fair amount of effort on. Both ultraviolet astronomy and telescope experiments, both of which use the anti solar airlock, which we still have. One of these is S019, which is an ultraviolet, well, it's a objective prism spectograph, which Carl Henize from Houston is the PI. And the other one is S183, which is a French, again, well let me just call it a spectograph. It does, it's somewhere between a filter and a spectograph.

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It does separate out the spectral response or the spectral emission of the stars. Both of these we spent a great deal of effort trying to schedule and get what we could during the early part of the mission. Let me be perfectly candid with you, that we did not on these particular two experiments, meet what we had hoped to premission, for a number of reasons. Let me just explain these to you so by doing that we give you some idea of the sort of things that are going on in the particular, I guess part of what my job is but some of the trade offs that go on in this business. Both of these astronomy experiments require dark of the moon observation. That is moon between last quarter and first quarter. And as a result of our delayed launch we launched so that the last quarter was at just about exactly on launch day or the day before or the day after of Skylab II. This meant that the 14 days which we normally had to do these wxperiments was now shortened to about 8 or 9, due to the start up activities of Skylab. Which would have been there whether or not we had any problems with Skylab I or not. Which meant that in 14 days we were trying to accomplish what we - or in 8 days we were trying to accomplish what we thought we could have in 14. On top of that, there were the additional problems, which, really I must say, up to the present time, and will continue

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PARKER - 14. On top of that there were the additional problems which really, I must say, up to the present time, and will continue, have presented as much problem as the power. And that is the problem of trying to accomplish everything we hoped to do in the pre-mission flight plan. You've all seen that blue book which sets out what we would have done on a nominal mission. And in a nominal mission we would have come fairly close to it. However, in this particular mission, having been shortened by a day at the beginning and having lost a day - between a day and two days here in the middle to do this EVA - pre-EVA, post-EVA operations on top of the EVA. With those losses and trying to cram all those other things back inside, you know, if you've got a size 10 foot no matter strong a shoe horn you've got, you can't put it into a size 8 shoe. And we've doing a lot of shoe-horning over there. When we do that we have to try to take into account priorities and it's not very nice to tell one PI that his firm doesn't have as high priority as another one, but when you get right down to it on a mission like this with as varied a scientific complement as you have, that is the case. And so we've been making a lot trade-offs, we do it every night and as I say, particularly again tonight, we're going to try and make some sort of general trade-offs for the mission. Having said that, let me just clarify one thing I've said there, and that is that this crew time - the time to schedule these things - trying to put them in every day is as I said, has been as big a problem so far and will continue to be as the power was. The power, I must say in all tribute to the vehicle systems people, the experiment users of power are, by in large, not large users of power. Most of the workshop power or the great majority of it - 75 percent goes to experiments. The result of the power problem we used to have was that the only way that we could save the power really was to take it out of the vehicle systems. We could not do much reduction in the experiments because you don't - you know, you don't trim the top end of your - well, let me put it this way - the power for the experiments was the very tip of the iceberg and you don't change the mass of the iceberg very much by chopping off a great deal of the top. And the - most of the work was done. And I say this as a tribute to the power people and the vehicle systems people. Most of the work was done and every day trying to see what systems we could eliminate during that day - at least during the work day in order to meet the experiment program that we set up the night before. And they did a truly heroic job. I'm quite glad we got the wing out because obviously, it's not clear how much longer we could have done that - right now let's face it - if we

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lose another CBRM like we've lost two already, when we've got 2500 to 3000 watts, the capability just given to us yesterday, we can much better absorb that. We don't want to lose it, but we can much better absorb it. And last night we can turn, as it were - and you've heard this yesterday quite a bit, but it does bear repeating. Last night we were able to turn the lights back on Skylab for the first time and it's a great relief to know we've got 6500 to 7000 watts of capability instead of 4000. With that general discussion of corollaries let me pass it to Bill and let you say something about the ATM and what they've done.

NELSON All right. As far as the ATM is concerned, we're fully powered up and operating except for the two CBRM's that we - noted that have been failed previously. Two of them are out and we have one that's slightly degraded. The experiments onboard the ATM are working satisfactorily. I guess the major glitch we had there concerned the door on S054 - during EVA we had the crewmen pin that S054 door open permanently. And today it went by fairly satisfactorily. We had two complete manned passes with the ATM, plus we do our unattended operation when we - RF commands up to S052, 55, and some of the other experiments. And tomorrow we plan to do a full five passes, manned passes with the ATM, plus our usual unattended operation. And we have no - in view of the fact we do have the workshop power backup we have no curtailment of ATM operations now and we'll just - tomorrow we'll see how it goes. We have a pretty busy day to go tomorrow. And that's generally all I have to say about the ATM. We're - everything's performing fairly satisfactorily now.

PAO Okay - -

PARKER I might note one thing that Jack pointed out. I don't know whether I said it or not - 75 percent of the power requirements go to the sytems not to the experiments. I don't know whether if I said 75 percent went to the experiments. I don't know if you guys wrote it down either, but if I didn't and you did - it should be 75 percent to the systems.

PAO Wait for the mike. Abbey?

QUERY - Parker. I wonder if you could discuss the Earth Resources experiments a little more fully. Particularly in looking at it over an eight-month program. How much have you lost, first in delaying this first mission, and then with the power shortages?

PARKER Okay, it's a little hard to - now I can sit back and say, hey, you know, we're going - everything's going to be perfect from now on 3 and 4 and therefore we look at this thing and one of course doesn't know that.

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In terms of this mission we had hoped - we had expected that we'd have 14 Earth Resources passes. To date we've gotten either four or five and I guess we can expect to get another five between now and the end of the mission. Of these - well okay, so that's 10 so that means we're down five. As I recall we hoped for 30 each on the next two missions. If we get those planned 30 plus the 10 here you say we end up with 70 as opposed to 75, which if you count percentages out comes out pretty well. However, in terms of this mission in particular, I think the figure of 10 at the very most, probably, 12 Earth Resources passes as opposed to a pre-mission plan of 10 - or excuse me a pre-mission plan of 15. That's probably a realistic estimate. So that that's what we're talking about in a number of things. There are other aspects to this mission, and that is that this was the Spring growing season mission - part of the mission, whereas Skylab 3 was the Fall harvest season part of the mission and we could make comparison - -

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PARKER - next to this mission, and that is that was the spring growing season mission, part of the mission, whereas Skylab 3 was the fall harvest season part of the mission and we could make comparisons between the two. Clearly by launching late, namely two weeks late on Skylab 1 - Skylab 2, we've lost some of that capability. Also, because of the lack of power we probably have not covered the midwest as well as we should have. There are aspects of that which indeed are not being met. I guess that's the - that's probably the area where we're suffering the most. The growth season coverage, both because of the launch late, and because of the fact that to date - now that could turn around in the next 4 or 5 days, and we could get all the agriculture in the midwest that we want in the growing season, in the next 4 or 5 days, although it's June instead of May. However, if we continue the way we've been going, that means we will only get one or two and at the very most, probably three passes in the midwest, and so this coverage will, indeed, be, - probably I should say substancially reduced. It won't be as hoped for, at least for the growing season, that doesn't mean we won't get midwest coverage and agriculture coverage during Skylab 3 and 4.

QUERY Can you go in a little bit to how much you've lost by having these shortened EREP passes for the -

PARKER Okay, the shortened EREP passes, as you understand, mean we don't cover as much of the ground track, and this basically means we don't get as many of the principal investigators done. What we've so far, really lost on the shortened ground track has been the western United States, mainly because by the time we get there the orbit is shifted around, and we're looking at the south-west instead of the northwest. Now we - We have however, right now, even with these shortened data take passes - we have had passes that scanned all the way from Rapid City, South Dakota, to the Virgin Islands, which is a short pass to the EREP people, but it's a pretty long pass to me. And in particular, I mentioned those because on the Virgin Islands, we have test sites there, and we also have a particular concentration of sites near Rapid City. So, yes there has been a degradation, and that's where EREP took it's degradation was in the shortened passes. That really means that, instead of getting 35 or 40 test sites in a pass, we've only been getting 15 or 20 probably, and those are just numbers off the top of my head. They'd have to be confirmed and it might be plus or minus 10 in either direction, probably.

QUERY Have any of your test sites been completely lost? Will you have to wash out any because of the shortened passes?

PARKER I would say no, for the following reason. Number one, or primarily, because all those sites are again acceptable on Skylab 3. There are a number of test sites I mean, there are I don't know - there were some hundreds, 2 or 3 or 4 hundred test sites, and we certainly were never even going to get all of those on Skylab 2. That wasn't even our intention. And we certainly don't - we won't get them all on Skylab 2. We've confirmed that. We will, however, still have - those sites will be all accessible, some of them we didn't even want. Some of them of course, to give you a typical example, snow, and snow pack and ice on the Great Lakes and things like this, which clearly we didn't want til Skylab 4. But in particular - there are some sites that we won't get on Skylab 2, a great number of them, if fact, but all those should be accessible again on Skylab 3.

QUERY And Dr. Parker, could you talk some more about some of these habatibility experiments, any surprises that have come up there, and particularly the acoustic conditions inside. We can all hear that Skylab is a very different spacecraft up to any we've been used to, I mean you can hear the country music going pretty well, and they sound hollow, and -

PARKER Okay, the main reason for the hollowness - You understand the main reason for the country music - but the main reason for hollowness, of course, is that they're using speaker box intercoms, like sitting and talking on a desk squawk phone instead of sitting and talking to a telephone, where we had the head sets before. No, I don't. The data for the acoustic measurements, I believe have been sent down on tape B, however I am not familar with what the results of that are. I'm not sure what the PI has done particularly analysis on it. The other thing, such as habitability are primarily tied up in 50 millimeter film that will be reviewed by people - sort of time and motion study things, after the mission, and on filling out, well, as you like, for want of a better word, questionaires or checklists or something, in terms of either reading those into tape recorder B, or writing down comments on actual paper that's up there. Those results, also, really aren't available at the moment.

PAO I think we can probably get Mr. Bob Bond, and Admiral Johnson, PIs on both of those experiments for you later, if you want, Angus.

QUERY How many test sites were you going to go over on this first mission, and how many have you - will you not -

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PARKER I have no idea, no idea. That's kind of a fallacious question, really. Let me beg out of it that way, because pre-mission, we said A- we'll do 15 test sites, or 15 tracks, excuse me, one of those is a calibration pass on the moon. We'll do 14 tracts, if we can. And those 14 tracts, we didn't know where they'd be, and of course each tract, you know, depending on where a tract is nd where it's done, and depending on what the weather is, depends on how many sites on it, so I can't even multiply 14 by a particular number to give it to you. It depends totally on the tracts.

PAO I think we can give you on each pass, we have the number of test sites in the pass and the number that were accomplished on each pass. We have that outside.

PARKER They do publish it somewhere.

PAO It's in the daily summary report, yes.

QUERY And in losing some of the coverage of the western United States, was there anything there that you were looking for that you might not be able to get in subsequent missions?

PARKER I don't know. I frankly doubt it.

PAO Dr. Wilmar should be here momentarily I hope he can -

SPEAKER We are planning a whole EREP presentation, however, Abbey, as a seperate presentation. I'm sure we'll be able to answer your questions at that time.

QUERY I think so, but it's kind of vague. I know you haven't got much of the data back, because so much of it's in the form of photographs, but --

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SPEAKER I think so, but it's kind of vague. I know you haven't got much of the data back because it's - so much of it's in the form of photographs, but has there been anything in the ATM operations or any of the corollaries or anything else that you consider, really, an outstanding result to this point? Have you been particularly interested by anything that has come across your desk?

SPEAKER (Garble) just got the corollary or some primary ATM? The - one thing that was of a particular interest was a so-called coronal hole and it was discovered - you might have seen some pictures of it in the SJV - the S082 - associated with the S082 experiment. And, of course, you - the ultraviolet doesn't penetrate the Earth's atmosphere so when we sent some TV pictures down to Earth and they enhanced them in the computer, they saw some patterns which were indicating a wider variation in UV there on the Sun. One area that looked like it was depleted somewhat compared to the other - it wasn't as intense view E-wise. And since it wasn't as intense in that particular wave length it was called a sort of a hole and it was a surprising thing we hadn't expected. That's the most surprising thing from a scientific point of view I think I've noticed so far.

PARKER Yeah, let me add on to that. The - by and large, except for the medical results you heard yesterday and the telemetry that does come down from ATM, that's really essentially all the information we have before the end of the mission. The Earth's Resources equipment - even the stuff that's not on photographic film is on magnetic tapes in the spacecraft and so will not be returned until the end. So we have essentially, absolutely no feel for the data. All we can have there is a idea what we went over. I mean, you know, we went over the hurricane yesterday - or day before yesterday and we only went over this number of tests sites and all that. We can be excited about the idea of going over what really was a pretty good-sized hurricane. It was one of the hopes of the S193 people to get something like this during the mission. We didn't expect to get it during 1, we expected to get it during 2. Maybe we'll get some more during 2. But to achieve that that early was indeed a very high point for those people. However, we don't have the data back so we can't say what we've learned. In terms of the ATM, yes, we do indeed have data downlink and I think the existence of this coronal hole and what - that's also to be ranked as a discovery of the S055 people. You know this stuff telemetered down. The raster and spectral scan of the Sun. There is also telemetered down, and there's a tremendous mass of data there which is slowly being put

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together and they have seen some things that they suspected - I mean were not total surprises. They suspected they were there but they were looking for them. Things that were kind of right at the limit of their resolution and that were theoretically predicted, but they were at the limit of the revolution of the previous osos. And things that they are now seeing from the rapid changes of intensity and very small areas instead of gradual fluctuations. And the extension of some of the chromospheric lines and coronal lines out into the - out into the edge of the - beyond the edge of the Sun, which we basically knew were there, but for the first time now are beginning to get quantitative measurements and to trace their - the exsistence - or their intensity out there. So, that plus the XUV pictures which are really fantastic and exciting, are the biggest things. I mean you can sight little things that are really not news worthy such as the S052 PI and the basis of television pictures that were sent down - this is the coronograph on the basis the television sent down, not on the basis of this final flight film, but on the basis of the TV downlink has been able to verify so far that - the cleanliness of the system - the reduction of the scattered light is, as I recall, about a factor of 10 better than what he - on the spect (garble) is that right? The scattered light - a coronograph essentially blocks out the Sun so you can see the corona on the outside of it. And therefore, since the Sun is a million times plus brighter than the outside, any scattered light from the Sun just washes everything out. And he's been able to make measurments from the TV film - a scene - I'll put it this way - one of your boys told me the other day that he was better off by a factor of 10 than what he'd really been able to measure on the ground and what he'd been able to hope for. So, there are things like that - that's not a piece of scientific data that's going to change the world, but it tells us the things that are working well onboard. For the corollaries, the particular ones like S019 and S183 are both on film and they'll both come down and we know we have passes for them. I mean we know we've obtained plates for them. How those plates turn out, how significant the science data from them is - turns out to be is yet - you know on the order of months to a year away. So we really don't have anything to report there. I think we might note again - you probably are aware that we had a problem with S019 the first time we put it out. I think one of their great tributes to the crew and the people back here working on it is that we were able to overcome that problem. Same thing exsisted with S183. Little, nitpicking, hangup problems that could have greatly degraded the experiments, but we were able to work around. And I site those as something that we've

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been able to do and something that's excited me about those two experiments even though we don't have the plates back from them yet, so we can't say what the data is really is worth.

QUERY I guess both of you have worked with unmanned experiments analogists to this. Does it feel a lot better to have somebody be able to fix the stuff rather than lose the data? That's a silly question because I'm leading you into the answer, but would you talk about that subject for a minute?

PARKER Number one, I believe you know the answer. Number two, I think I have to in all honesty say that I probably have not had much to do with unmanned spacecrafts since I work here and I worked on Apollo 15 and 17 and both of those are very much manned spacecrafts. It's very reassuring to me to be able to have a problem that shouldn't have happened happen and it - you know - we don't like things to happen to be able to prove we can do it. We don't test ourselves this way. We do that during the simulations, but when something comes up it's very reassuring and very comforting to be able to say - well I can go back - I more or less associated with OAOA-1, which was the first OAO - which - I don't know whether it had the same problem that Skylab 1 had or not, but whatever happened it got up there and got in very bad shape. We never knew what happened - -

END OF TAPE

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PARKER I don't know whether it had the same problem that Skylab I had or not. But, whatever happened, it got up there and got in very bad shape. We never knew what happened, because we never got anybody up there obviously. This was back in 1964 or 5. Probably in 1965, it was a long while ago. And it had power problems, there was something wrong with the way the thing was deployed, a panel may have come off or something like that, and the thing died in about 2 days. We just couldn't control it. We couldn't send anybody up there to do anything about it. I know at that time, the tremendous dismay that was felt by the people who had spent already 3 or 4 years working on that particular satellite. Now they recouped it and 2 years later they launched AOAO2, which as you know was one of the outstanding successes of the unmanned program. However, I am familiar with that even though that was not my satellite. And compared to that, the ability to send someone up there and for one fix the thermal problem and then 2 weeks later fix the power problem. And right now we're just back the way we were, you know, at the beginning of May, virtually. And to be able to do that and recover from, what must have been, and I guess, I'll have to let Marshall say how bad a launch it was. But, to recover from what was obviously a very degraded situation, that, well, is an extremely pleasant business to be in. S019 and S183 are the same thing. Those people, the PIs on that, those, you know that't not a major head line item. I don't imagine it made the headline of any paper. But, the PIs for that had spent 4 or 5 years of their lives working on that. And for something to go belly up and break the first time you use it, you know that's the sort of things that drives people over the brink. To be able to sit down that afternoon, take apart the paw unit here or a train unit, and discover what the problem might be. To send up a pad to the crew and have them take a screw driver and have them take it apart and find the interference and put it back together, to me, has made my whole day. In fact, I think it made my whole week.

QUERY Just a point of clarification. The PI whose ten, biofacture of ten better off in his pictures of the corona than on the Earth. Is that presumed to mean it's on the Earth during a solar eclipse as well?

PARKER Yeah, in fact the, he was a factor of ten better than he expected. He expected to be better off in the eclipse to begin with. There was a factor - what he said is as I understand it, now we're really extrapulating. But what as I understand it he could make tests in special vacuum chambers and stuff here on Earth.

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Get the scatter light down as low as possible, and so he could say, hey, I'm better than, and I think the figure was 10 of a minus 12. And there was a scadder test that he was about 10 of the minus, he could get it down to 10 of the minus 12 of the center of the Sun. And the way I understand it he is now - but he couldn't measure any lower than that just because there was still residual background. He hoped that he was better than that, but that was good enough. That was what he was aiming for, or that was the goal he had set, he was at least going to reach that. He was hoping for more, indeed now he's found he's a factor of 10 better what he could measure on Earth. I hope those figures are right.

QUERY This may not be the place to ask a medical question, but while Weitz was in the tank for the M092 this afternoon, did you notice any cardiovascular problems there, deterioration?

PARKER I was sleeping while it was going on. You'd have to ask the medics about that and they probably won't know until tomorrow at least, because that data gets dumped and then they play it back and do their stuff. And it takes them at least a day.

PAO Okay, Dr Parker, Mr. Nelson thank you very much. Ladies and gentlemen, that concludes our science briefing.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 8, 1973
9:30 a.m. CDT

Participants:

Charles R. Lewis, Flight Director
S. A. Liebergot, EGIL
Milton E. Reim, PAO

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REIM Good morning. We'll get started here with the morning change-of-shift briefing. On my right with Chuck Lewis, the overnight flight director, and on his right, Sy Liebergot, the EGIL. We'll get started with Chuck.

LEWIS Okay, I believe Neil Hutchinson was here very late last night, about 1:00 or 2:00, and talked a bit about the coolant loop problem we encountered, which kept the crew up a couple hours late. And we let them sleep in 2 hours late this morning. The only systems anomalies, we had during the night when I was on. We lost one of the airlock module tape recorders. As far as I know, it was lost. We run a command malfunction procedure from the ground. All of our indications were that it was lost. There was one final check for the crew to make this morning, and I have not been listening to air-to-ground; so I don't know if they've made that check. But if it was lost, it meant - we scheduled time in the first part of the morning to change it out. There're four spare recorders on board. And that takes about 20 or 30 minutes to change one of them out. As far as today's Flight Plan, we did make one change. We eliminated the S073 work items in the Flight Plan to allow the crew some of the requested cleanup time, some of their requested cleanup time. We'll probably get most of the cleanup, post EVA cleanup, done today. It may require a little tomorrow. And basically, there was no change in the airlock module coolant loop from what Neil's shift had earlier in the evening, but Sy Liebergot is here to answer any specific questions you might have with regard to that. All right, we'll take questions. Start here with Bruce.

QUERY Well, I got several, naturally, but I'm going to start with one before we get to the coolant loop, if I can. Sy, what - how do we stand on power now, what is our wattage, what are we getting out of the SAS wing 1, and will we gain more when we get to the higher beta angles?

LIEBERGOT Okay, presently we're supplying about 1700 to 1750 watts from the AM EPS, airlock module batteries. The capability there is - we think will be 3000 watts. Later today, we do intend to go ahead and crank the COURSE ADJUST, REG ADJUST pots up and - to about 2500 watts. We just, you know, take it up in steps. And on the ATM electrical power system, that's presently supplying 2700 watts of the total requirement. The total load, when we came over here, was about 4200 watts. Those figures ought to add up. The capability of the ATM CBRMs is around 4000 watts, with regard to maintaining the depth of discharge, (garble) 30 percent or less. That's the same ground rules we've been using. The ATM is now presently transferring about 360 watts to the airlock module.

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And the PCG batteries, the airlock module batteries, were achieving a 99 percent state of charge at about 20 minutes after sunrise. So we got lots of ways to go before we crank the system up completely. Obviously, you know, we can keep cranking until we get 99 or 100 percent state of charge just before sunset, and that ought to be close to 3000 watts. But I'm just king of guessing now, because we've got to be kind of careful and cautious about this thing, bringing the system up to full capability. That's how we stand there, and we're presently in the mode of trying to figure out how powered up we can go and what things have to be brought back up and who can have what power in general.

QUERY Okay, is CBRM 17 still down, degraded?

LIEBERGOT It's still the same as it was the last time we asked; it's behaving exactly the same way.

QUERY And could we go back to the coolant loop problem now? I understand that 36 to 38 degrees is still not desirable. What do we want that, and could you run through, very briefly and in as simple terms as you can, how we got the problem, how we solved it?

LIEBERGOT Well, we really haven't solved it. I don't know how we got it, I don't think, and we don't know how to solve it. Let me preface it by the fact that we have not yet reviewed all of our NDRS data, all of our history data. Haven't retrieved it all and analyzed it all yet, so that's what Chuck was referring to - that we don't know exactly how we got there without looking at that data in great detail. However, - and I'm not sure how to tell you this without going into a lot of detail, but there is a TEMPERATURE CONTROL VALVE B, Bravo, in the primary loop. Now we need to go back one more step. We're operating just with the secondary coolant loop before the crew's getting ready for an EVA. We turn on the primary coolant loop, which is down. And so we had both loops up at this time. The primary loop had been off for a couple of days for power conserving. And when the crew went to the EVA position on the heat exchanger valve to get flow through their EVA suit heat exchanger, that's when the problem started. This temperature control valve temperature - temperature dropped low, dropped down to 10 degrees. It appeared that the flow rate sensor failed, off-scale low, and when we looked at the data, it did look like the control valve had failed to the COLD position. It wasn't mixing very much hot returning Coolanol, and it did appear that that froze up the suit heat exchanger 1. What we did then was, we had the crew shut down the primary loop, since it was cold, and we certainly didn't want to rupture the suit exchanger, which has got water in it. And we had both crewmen go to suit loop 2, SUS 2 as we say.

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And that's where we left it for the EVA. Later on - Apparently, the primary coolant loop had cooled the secondary loop down considerably. And later on, when the crew was asleep, they got a LOW TEMP alarm on board which woke them up. And they went through some configuring on board, and by the time, - when we finally did get it straightened out, we ended up with configuring two LCGs, liquid cooled garments, to the suit loops and wrapped the LCGs around water tank number 1 to pick up heat from the water tank. Water tank 1 is at the plus-Z side of the vehicle, the hot side, and the other water tanks were warm anyway. And there are a few other things that happen here to indicate that the - that the secondary loop is very cold. But the way we left it was

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SPEAKER And there were a few other things that happened here to indicate that the secondary loop was very cold. But the way we left it was picking up heat from the water tanks. And when we took over last night we had a stable situation though it was still cold. We'd like to have this control valve temperature at about 47 degrees and it was running around 40 degrees all night. And just cycling up and down with the orbital night and day. So it's still cold. The secondary loop is still cold with this valve. The primary loop valve, the same valve, looks like it's failed almost completely over to the cold position. And what we have to do now is find out some way to get these valves returned to an operating position with no control.

QUERY Okay, specifically then when you hook the LCG's in did you hook them in only to the secondary?

SPEAKER Only to the secondary coolant.

QUERY And which was - that temperature was being brought down because of its closeness to the primary or they run side by side or something like that?

SPEAKER Well, they're interchanged. Now. We're faced with having to find out if we can run the primary suit loop, see if we can thaw it out.

QUERY If you can if - bleed it off so it won't freeze up all together, maybe rupture that heat exchanger?

SPEAKER You talking about the one we think is frozen, Bruce? I'm not sure how we're going to approach thawing that heat exchanger out. Like I say we need to look at the - we haven't retrieved all of our history data and examined this in great detail yet, but we think it's frozen. So that's one thing we're facing in addition to the primary coolant loop.

QUERY I have a couple. First I have trouble with these heat exchangers because I don't know how many of them you have or where they are physically. Can you just kind of describe the systems to that extent and then talk about the conditions of the heat exchangers and what possible damage could have resulted in them. Is it likely or do we know whether the heat exchangers - any heat exchangers have been damaged?

SPEAKER Well, we don't think any heat exchangers have been damaged because we shut the loop down pretty quick. These suit heat exchangers, you know the same ones we were worried about keeping from freezing during the unmanned phase. They're on the cold side of the vehicle away from the Sun so you know we're not getting any help from the Sun in this case. But, I'm kind of lost - don't know what else to tell you about it right now.

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QUERY They operate only on the suit loops?

SPEAKER Right. The suit coolant loops are water with rust inhibitors in them. And they dump their heat through these heat exchangers into the airlock module coolant loops, through the EVA heat exchangers. They are kind of wrapped around each other. There is no interchange of fluid - it's just heat exchange. Now if the airlock module coolant gets super cold, it's going to freeze the water in the suit coolant loop and that's what we'd like to avoid. Now, like I said, I'm not - we think it's frozen. How solidly it's frozen we don't know.

SPEAKER Look, basically only implemented a holding action on this thing. We don't know what the specific problem is, like Sy said we've still got a lot of dump data on remote sites we haven't brought back in yet. We had machine problems last night, computer machines going down - we got behind on that. Marshall, as I know it, by 10 o'clock today is having a meeting with various contractors that designed the loop and will be addressing some corrective action. We have no idea what that is right now. It may be such things as wrapping the suit hoses we've got now around lights, anything to get heat into the system but that'll be addressed later today and we can only speculate on what that might be. We're basically just in a holding position right now.

QUERY First, are these temperatures you're giving, Centigrade?

SPEAKER Fahrenheit. And you've got 22 degrees below freezing when you say 10 degrees. Okay.

QUERY You didn't explain why it got so cold, don't you know or what? Do you have any theories?

SPEAKER Probably have lots of theories but you know they're just theories - for example, and a lot of them are very personal - the primary loop was off for two days and it could have been - you know the radiator fluid sat there relatively cold and it could have - when we turned the primary loop on it could have slugged that modulating valve and ran it over to full stops at one position where it stuck. Full cold. And I think it's wax. Now it's conceivable if we get that wax warm again it'll shuttle back. It's speculation.

QUERY Could you get this a bit in perspective for me. I'm not quite clear how serious this is. If you don't solve this problem, do you lose capability to do EVA or do you have to come home or what?

SPEAKER Speculation again. I don't - it may impact the EVA but I think - Sy may correct me if I'm wrong - we could probably do the EVA in the type configuration we were in yesterday with the - is that basically correct?

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SPEAKER Yeah, before the secondary loop became - it got colder. It got colder because we operated the primary loop again and it drove the temperature down a little more but there is no reason to believe that we shouldn't be able to do the EVA if we can get the secondary loop under control and get some more heat into it. I think we'll be all right there.

SPEAKER Have to have a secondary loop - we could do without the primary, I think, and accomplish the EVA. It doesn't mean we'd have to come home early if we can just hold where we're at.

SPEAKER Excuse me, there is another capability. We could go on PURGE FLOW for cooling and just blow air - blow oxygen or air through the suit loop just like we do for the command module. The EVA/IVA crewman is on PURGE FLOW only, 12-pound in our O2 flow. We could do that, yes.

QUERY I've got a couple more on different points. So far as the 18 ATM batteries are concerned of which you've lost 2 and got 1 or 2 shaky ones, now you've got the workshop batteries back you can presumably afford to lose the worst if more of those go, you're still in business I presume. You can feed across to the ATM the other way now can you?

SPEAKER Yes. We could lose more but we're going to make every effort to protect what we've got. We don't take any chances with losing any more.

QUERY Could you help me a bit with the crew's position, was it in fact to be a day off today?

SPEAKER No. I think I commented earlier here that the crew had volunteered to do experiment operations on their day off. And the only thing that they came back to us on was for additional cleanup time, post-EVA cleanup, because of the various items that they had to construct to accomplish the EVA yesterday. So we were going to give that back to them. We had scheduled before the coolant loop problem last night, about 8 or 9 hours - man hours of crew time for this clean up work. Then we had the problem, the crew slept in late this morning 2 hours so we had to take 6 man hours out. So we had to jockey the Flight Plan around very late last night to give them back some cleanup time. We've got close to 6 hours - we may have to make up a little more tomorrow. So basically the Flight Plan today - we've got 1 M092, M171 run in. We've got two ATM passes, just the synoptic - morning and evening synoptic. We did keep the showers in for the crew. Majority of the other time is cleanup. Even then we didn't quite get what the crew had asked for.

QUERY What I was trying to establish, this is the day - this is their second day off which they have in fact given up, there'll be no - this is the day - there'll be no replacement day.

SPEAKER Yes, that's correct.

QUERY Thank you.

QUERY Two things? When are they going to get their next shower?

SPEAKER Today.

QUERY They will go ahead and take it this afternoon?

SPEAKER This afternoon. Yes.

QUERY The other thing is, in that primary loop, the SUS loop has water in it or the exchanger does, right, and the loop carries the Coolanol, is that?

SPEAKER You have water in the suit loop SUS, . okay, and you have the coolant fluid - I don't know what the - Coolanol - in the airlock module cooling loop and you pass those through a heat exchanger to - and you use the Coolanol to cool the water for the SUS loop.

QUERY How long can - and the - you've got 10 degree temperature and -

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LEWIS Pass those through a heat exchanger. And you'd use the Coolanol to cool the water for the SUS loop.

QUERY How long can the - You've got a 10-degree temperature in that - in the primary SUS, or is it the AM coolant loop - the primary coolant loop?

LEWIS The ah - -

QUERY I'm a little confused on that.

LEWIS Okay. When we had the problem with the primary loop - When we had the problem with the primary loop, the temperatures at the output of the control valve dropped as low as 10 degrees. That loop is shutdown, now.

SPEAKER That's the airlock module primary coolant loop. Not the SUS loop.

QUERY Is it still at that temperature?

LEWIS No. It's up a ambient now. It's up a lot higher, because 's down, it's just stagnant.

QUERY kay. Then that - -

LEWIS Just stagnant.

SPEAKER I'm really not up to speed on this cooling system. And I haven't been able to find the schematic. But, is it fair for me to say, that the only possibility of damage would result from excessively low temperatures in the airlock module primary coolant loop freezing the water in the SUS primary coolant loop? I mean that wax in the valve, is not affected by the temperatures? So the real possibility of danger, is water freezing and maybe rupturing something?

QUERY Maybe you've answered this, I'm not sure. But, are all the AM baterries now in good shape? They are all taking charge, returning it to the system and work - all 8 are working fine?

LEWIS We're getting 99 percent state of charge at 20 minutes after sunset.

QUERY Okay.

LEWIS That means we've got lots of time left in daylight to get more out of them.

QUERY Just a little one here. On the Flight Plan, you had the S019, I guess that was take it out of the airlock and the aline the multispectral scanner, did you cross that off?

LEWIS No. We took out - We went ahead and sent the pads up for the pads up for the S073 work that was scheduled for today. S019, of course, has to precede that work for its in the SAL - has to be removed so we can get the S073 in. We decided late this morning that we ought to give the crew their clean-up time so we advised them to delete the S073 work items, that includes the S019. And use that for clean-up. I understand that they had all ready taken the S019 out of the SAL and stowed it. Now that would have had to have been

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done in the morning anyway, in preparation of the EREP pass, because they had an ETC, Earth Terrain Camera, scheduled for the EREP pass.

QUERY Is Weitz still set to aline the multispectral scanner, then?

LEWIS Yes. That's still in. Right.

QUERY Undoubtedly you can look ahead a bit for me, but I'll probably be leaving today. I think Conrad was saying this morning that he'd like Weitz to do the next EVA with him on day-26, instead of Kerwin, to share the wealth, as he put it. Have we any idea yet, whether you're likely to deploy the other curtain, whether the parasol is goint to last out?

LEWIS I don't think that's been decided yet. I know that's in work. I don't think the decision has been made.

QUERY But there was talk of whether it had degraded yesterday, I didn't catch up with it?

LEWIS To be honest with you, I'm not caught up with it either. But I know that that particular item is in work and that decision has not been made, final decision.

PAO Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 8, 1973
2:00 a.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
J. Steve McLendon, EGIL
F. Dennis Williams, PAO

SL-II PC-33A/1
Time: 02:02 CDT 15:07:02 GMT
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PAO This is Skylab Control at 6 hours 59 minutes and 35 seconds Greenwich mean time. At the present time Neil Hutchinson the Flight Director and Steve McClendon the EGIL on the off-going shift are on their way to Building 1 briefing room. There will be a press conference held shortly in Building 1, approximately 5 minutes from now. The crew will be waking up late tomorrow morning. They will be allowed to sleep in for an extended period of time to make up for the time they lost tonight because of the coolant problem. And so we will not have commentary as ear., in the morning as normal. This is Skylab Control at 6 seconds after the hour.

HUTCHINSON Well, I guess they're ready. With no introductions, you know who I am, I'm Neil Hutchinson, this is Steve McClendon, the EGIL on the silver team. And I'm sure you're here to find out about the problem we have with the secondary coolant loop this afternoon and this evening and tonight. I have the dubious distinction of being the first, and I hope the only guy, to wake the crew up in the middle of the night to do something, which we did tonight. I'm going to have to go back and recap for you how we got into the situation that we're in. Well, we're out of it now, effectively we hope. It started way back before the EVA today. You know in the airlock module we have two coolant loops, primary and secondary coolant loop, and prior to the EVA today we turned them both on, we've been - have we been running with them both on regularly?

SPEAKER No.

HUTCHINSON I forget. We've been running with only one on, the secondary. We turned the primary loop on and we were running with both of them on, and the first thing that happened today and it happened prior to the crew getting out - is that correct? We had - one of the little valves in the primary loop that controls the mixing of the warm coolant and cold coolant, basically, hung up or failed, or became contaminated and got stuck or for whatever reason, anyway, the valve hung up in the full cold position, such that we were putting all of the coolant in that loop through the radiators. And that made the loop all of a sudden become very very cold. Shortly thereafter, we turned the primary loop off, and we ran the EVA on only one loop, the secondary loop. The other thing that was going on at the same time, as you know before the EVA we didn't have all the electrical power that we have now. So in order to conduct the EVA we had to do a power-down of the vehicle, a fairly significant power-down, over 1000 watts. And when you power things down, of course, you're turning off electrical gear that is on the coolant loop, which in turn does nothing but compound the problem because it takes off

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heat input into the loop, and so when the thing went hardover cold the loop really dropped quickly. And when the primary loop dropped it shocked the secondary loop in a similar manner. And, basically, the combination of these two events got us into the problem that we got into tonight. Now, the loops have, as a basic component, a thing called a thermal capacitor, and that thermal capacitor is just what the name says, it's a box of wax, that stores heat and gives up heat. Or stores cold and gives up cold, if you want to look at it that way. And, it takes that thing a long time to get warmed up or cooled down as the case may be, and that's the basic part of the loop that we ended up shocking very badly today, when we got into our problem. And it took it a long time to show up and I guess it took us a while to really realize what kind of a jam we had really gotten ourselves into. Because as you know, after we got the EVA complete, the crew got back in, we went into this pitched up maneuver to get some heat on the solar panel, and we were very concerned with getting the sections on the solar panel coming out. We weren't - we were watching the coolant loop, the primary loop was off, the secondary loop we kept thinking it was going to respond. The thermal - it's the darndest thing - thermal is an inexact science to say the best about it. Anyway, along about the time we start thinking about the panels were all the way out and it was about time to go back to solar inertial, which was a long about 7 or 8 o'clock, tonight, we began to realize that we were really in trouble in the secondary loop because now the fact that that thermal capacitor had been thoroughly shocked and was getting very very cold, was continuing to get cold, it was beginning to bring the whole loop down. And even though we now had started to turn electrical loads back on, so on and so forth, we just didn't lead the problem quite far enough. And we couldn't keep the loop up. And it kept falling off and kept falling off, and we kept thinking it was going to level off. And, we put on all the loads that we could possibly put on the thing. And the basic problem we had, before the crew went to bed tonight, was that we were trying to get the loops in a configuration where we had an automatic fail-over capability to the primary loop. And, we couldn't do that, because, I'm trying to make this simple - we couldn't enable the automatic switch-over to the primary loop because the secondary loop was so cold that if had we enabled the switchover, it would have switched over immediately to the primary loop. And you recall the primary loop is the one with this valve that's hung up in it. Now, we have another problem that compounds this whole situation, and that is that we have some equipment that we had turned on deliberately to help heat the loop up, that cannot afford to go without cooling. More than about 15 minutes.

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So you're between a rock and a hard place. You can't leave the gear on when you're not in contact with the vehicle for fear the secondary loop will fail, with the crew asleep, of course, and you'll burn up some gear, yet if you turn the gear off, the loop gets colder. So the situation, when the crew went to bed was, we were still thinking we were going to be able to control the situation by bringing loads on and we were modulating the loads on and off at each site, because we couldn't leave them on all the time for the reason I just stated. We had talked about, before the crew went to bed, shortly before the crew went to bed, this kluge that we currently have rigged up in the vehicle, and had decided against it, because, I decided against it, because I thought we were going to be able to keep the situation under control and I didn't want to keep the crew up. Well, it turned out, I guess we made the decision about an hour after they went to bed that we weren't going to be able to hold the temperatures in the loop. The basic problem is we had some heat exchangers, and as you know, in the vehicle that take moisture out of the air, and when you take moisture out of the air, it's plain old water, and water freezes at 32 degrees, and if the heat exchangers ever freeze up, you stand a chance of cracking the plates and ruining the heat exchangers. And we waited to wake the crew up until the temperature at the heat exchanger got down to 30 degrees roughly, and that occurred about an hour or so after they went to bed, which must have been about 10:30, when was that, about 11 o'clock, local time, Houston time. We woke them up and we had a plan, and the plan was, basically, the liquid cooled garments that they wore during the EVA today, the one heat source that we didn't have on that airlock coolant loop that was available to us, was to put the liquid cooled garment - one of the liquid cooled garments down into the workshop in a place where it was hot, hook up the big long umbilical that the crew had and of course, the crew wouldn't get into the garment just - -

END OF TAPE

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SPEAKER - hook up the big long umbilical that the crew had, and of course, the crew wouldn't get in the garments. Just set the garment down there. We hooked up the umbilicals, hooked up the water system, and turned on the pumps. In fact, we did this for both the LCGs we used today. They effectively unstowed the stuff they just got through putting away. And currently we have two LCGs up on top of water tank 1, and the secondary suit umbilibal system is operative and we are running a heat exchange effectively between the water tanks in the OWS and this coolant loop. And it has gotten us out of any immediate problem. And the whole operation took about 2 hours and fifteen minutes from the time we woke the crew up and we sent them back to bed. The loop is responding slowly but surely. It takes those thermal capacitors forever. When I left here the thing was like about minus 39 degrees and it was up from what, about minus 65 or something like that, below zero. And which means that the wax is slowly but surely warming up. That thing is a wax thing. Now, our plan for tomorrow. We think we know how - We think we - the loop is not warmed up sufficiently enough to where the temperature control valve in the secondary loop is controlling the temperature properly yet. However we think it will. The - one of the the problems we think may be hampering the loop returning to normal operations is we may have a very small amount of water in the glycol - in the coolanol loop, and as opposed to glycol, water and coolanol don't mix. And these valves - the one we're having trouble with in the primary loop and the one that is not modulating in the secondary loop, because the loop is too cold, have had a history of contamination from small amounts of ice. If you get the tinest bit of water in there, it comes out of solution and is just a blob and goes through the small orifices at the valve and freezes right there and mucky mucks the valve up so it doesn't work properly. So basically in the morning I'm not sure exactly what we're going to do, but I suspect that we're going to try and free-up the valve in the primary loop, by getting that loop good and warm and cycle a coolant through it, and see if we can't free-up that valve, and then we get that loop working, we'll go to work on the secondary loop. What we're doing effectively right now is artifically keeping the loop warm. Secondary loop still is not controlling the temperature properly. The primary loop is off, and we can stay in the condition we're in forever if we had too, but we don't - certainly don't intend too. The crew is going to get up 2 hours late in the morning, and we are madly scrambling over there now to redo the flight

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plan that we had tomorrow to accomodate them getting up late and undoing this kludge that we have hooked up to get us through the night. And we had a lot of other things going. One super thing that's going on, we're getting about 2,000 watts out of that airlock. 1800, 1700, I'm a little high in that, but anyway the airlock is pulling it's weight in gold at the moment. That's about what you wanted to hear, and I guess we'll ask questions, and I brought Steve along and he can tune you up on whatever.

PAO Would you please wait for the microphone because we're going to have a little problems getting things done otherwise.

QUERY One of the things that confused me that you didn't touch are Neil, in this pattern of things, was that up until - well during the period, say 45 minutes to, maybe as much as 15 minutes or so before you woke the crew up, the reports from over in MOCR were that the temperature was rising a degree or two. What was the pattern of that then?

HUTCHINSON Well the temperature varies as daylight and darkness, in daylight and darkness cycles, and for awhile it looked like we were going to hold our own and it was bouncing around 34, 35, and then it started down again, and then it would come back up and of course, not having continuous contact, and some sites being in daylight, and some sites being in darkness, it's no doubt you got a report that it was rising, because it was, but it was not significantly rising. See, it's so darn hard - the little blips in the thing mask the overall fact that it's headed down, and I don't know, didn't it come up some Steve, a couple of times as we were watching it. We wouldn't have waited anywhere near as long if we had known for sure that we were in a fix.

QUERY Okay, that was what I was getting at. Was it that variation that in part threw you off?

HUTCHINSON That, and the fact that thermal baffles everybody.

McLENDON I think what really got us into trouble thinking like that. You remember we tried a little experiment - well experiment, we thought well- we tried a little thing with this secondary coolant loop and you remember we shut it off for about 9 or 10 minutes or so, and the intent behind that was, if we shut the coolant loop off and let the heat loads build up in it and cut it back on, then we would get a pretty high heat transfer into the valve, and maybe thaw out any the ice crystals or anything that formed on there. Okay, we tried that and you notice when we were going to bring the secondary loop back up, we had a command problem and we had to ask the crew to bring it back up for us. Well, they brought it back up for us and it appeared okay then. The temperature at that time had seemed to come right back where it was before we shut the loop off, and it looked like we had helped ourselves just a little bit by leaving it off for 19 minutes or so. But when we did that, in order for the crew to turn it on they have to take command away from us, and do it manually. So when we requested them to give us command capability again, of course, when you do that the crew has to shut off the secondary loop again. And we have to turn it back on, so when we turned it back on the final time, then we really started getting into temperature problems and it started coming down a little bit on us.

QUERY What did this do to the temperature in the orbital workshop?

McLENDON You mean the gas temperature? Gas temperature inside the workshop?

QUERY Yeah.

McLENDON It didn't affect that.

QUERY What's it at.

McLENDON Well, the average gas temperature there, I think, if I remember right, was around 75, 76 degrees.

QUERY If you can't fix the stuck valve in the primary loop, and you have to leave the LCGs plugged into the secondary loop, what is that going to do to the EVA capability later for retrieving film?

HUTCHINSON Why, first off, I don't think we're going to have to do that. We'd be in a bit of - well that all depends. The loop depends on how fast - if we would have gotten ourselves in a posture where we couldn't afford to unplug the LCGs for 4 or 5 hours, we'd be in a fix. However, it's my opinion, for example, right now, right this minute I could go over there and turn off that suit coolant loop and I've got that thermal capacitor warmed up enough so I could probably be 8 or 10 hours before I'm in trouble again.

McLENDON Well, I think even in that case, when you go EVA, you have a crew when they're in the LCG, which is essentially better than the hookup we have now, because you have a live crewman in there with body heat in there in the LCG and you have two of them, and three of them if you want to count the PLT in the forward area.

HUTCHINSON And you got to remember also, we don't have to go through this mash-mash power down that we've had to go through to do this EVA because we've got all the power we need. So we want have to take a lot of loads off

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loop. That's a good point Steve made. As a matter of fact, I guess I'll to retract what I said. I think it won't have any effect at all. We'll probably make out all right, even if we have to stay with the lash up like it is.

QUERY If this had slid further, what might have happened?

HUTCHINSON Well, the worst thing that could have happened - you mean if the temperature had of gone on down?

QUERY Yeah.

HUTCHINSON The worst thing that could have happened like I mentioned is that we have these condensing heat ex-changers, which is you know, our prime device for removing water from the atmosphere, and they have some little plates in them that are covered with chamois cloth and so on. I don't know exactly the -

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SPEAKER -- covered with shammy cloth and so on, and I don't know exactly the configuration of them. But anyway, they're fairly fragile, and if you ever froze one up, you'd probably break it. And when you break it, then it - it allows an air path through it, and it won't remove water any longer. Now we have spare plates on board. I don't know how many; we got a dozen - half a dozen.

QUERY (garble)

SPEAKER But you don't like to do things like - nothing catastrophic, that's for sure, but we could have sure messed up the heat exchanger and the heat exchanger plates. There are some other things that you begin to worry about. For example, one of the things is the OWS heat exchanger, which is not designed to remove water; it is designed to remove heat, and if you start - if you do anything that messes up the water balance - In other words, humidity goes up a bit, and the OWS heat exchanger with a very, very cold coolant loop has a lot of cold in that heat exchanger. And it condenses water, and you get water in the fans and mess the fans up in there. So there are a lot of innocuous things that could get you, none of which are really big. But you - things you certainly will want to do.

QUERY With a condition now using the garments to cool it and assuming you don't fix it, can they go ahead tomorrow and just run a normal mission if they wanted to? With this set up and the cold coolant, can you operate the instruments and do everything just like normal?

SPEAKER Yeah, it's kind of a pain in the neck because we've got all those hoses running down out of the airlock, down into the OWS and so on, but there won't be any - there is no jeopardy to tomorrow's Flight Plan except for the fact that we lost the time. And we did guarantee them effectively that we were going to give them 8 hours sleep, because they were dead tired. Of course we ended up keeping them up a couple hours late. Even in the long run, if we ended up having to operate under this kind of configuration, I don't see it affect in any of the overall experiment operations.

QUERY You said in the long run - if you have to keep on this way - is this thing solvable, and can you fix it up and go back to normal?

SPEAKER We - we think it is, and tomorrow we'll - it's one of those things tomorrow will tell. We aren't going to mess with it anymore tonight, because there are are a lot of people looking at what the best plan of attack is to try and get ourselves back on an even keel. I think the basic - basically, the general engineering feeling both here and at Hunstville right now is that we're going to be able to get both the loops back. Once we get them - if we can ever get them warmed up, and if we do have a little water in there, and - that is the reason that our temperature control valves are not operating properly. In other words, if the primary valve is not broken, for example stuck in a hardover position forever, we'll probably be able to get back in good shape. And I - I - we'll probably go to work on it first thing in the morning. In fact, I'm sure we will.

QUERY If - if water in the loops is the problem, can you get the water out?

SPEAKER No, and, boy, when you say water in the loops, that's - that is a theory. And it takes a very miniscule amount, you know, like a pencil eraser full to screw one of these things up.

QUERY If it is there, you can't get it out.

SPEAKER That's correct. But you can get the loop warmed up to where it doesn't make any difference if it's there. And that's - I mean we've been operating these loops for three week - how long we've been up there - however long we've been up there - two weeks or whatever - three weeks and completely satisfactorily; however, we've never put them under the kind of thermal loads coldwise that they saw in the last 10 to 12 hours.

QUERY Then, if you can get them warmed up, there's no barrier to normal this mission, Skylab III, Skylab IV.

SPEAKER Normal everything. And we will be very careful not to get them cold again.

QUERY When do you think, other things being equal or better or worse, you can get them warmed up?

SPEAKER I suspect - well, I've told you that we're artificially keeping the secondary loop warm. Now the primary loop is off. I suspect tomorrow morning the ground - I think it all depends on getting all the engineering opinions sorted out into one concrete plan of attack. I would say tomorrow we will go to work on the primary loop.

QUERY I think the CAP COM used the word intolerable to describe getting the heat exchanger frozen up. Pete said, "We want to keep this thing going." If you hadn't got them warmed up, could you have got into a situation where it would have been mission termination? Not - You know, no danger for the crew necessarily, but inability to keep flying the mission.

SPEAKER I really - I really don't think so. I think that if - no, I really don't think so. Do you think so, Steve? We sure could have busted up some gear, but all of it is replaceable. We might have gotten into a posture where we might have if it would have ever gotten cold enough. And I doubt if we ever could have gotten cold enough to freeze the trying to do with the power system and he had a comment for us on B channel that would we please send them up a brand new set of checklists for operating the ATM from one end to the other.

QUERY That came over the air to ground too, didn't you get -

HUTCHINSON Yeah, it came over the air to ground. It came over B channel too in a lot more detail. He told us some of the problems he had with the system when he brought it up. Nothing that is indicative of any problems with the hardware but more problems with procedures and the fact that some things he had expected to be on weren't on. And he followed the check - the post-EVA checklist we had teleprintered him up and a couple of things that were supposed to be on weren't on at the time, namely the - I can't remember the - the fine sun sensor door wasn't open and something else. He had a whale of a time with that last pass. I think it was a combination of a lot of checklist mode and he was tired and we were tired and of course we were fighting the coolant loop problem at the time and I didn't pay a lot of attention to his woes on the panel.

QUERY What I was wondering about - are we ever - the press - going to see anything on what happened up there during the times when they were not in radio contact.

HUTCHINSON Oh, yes sir. I don't know any - I guess - I assume they had the recorders running the whole time and I assume that that's all been - will be released ASEP. There is probably a tremendous amount of conversation on there. Yes, you certainly will. I haven't seen it myself but it's got to be released here very shortly.

QUERY Under normal circumstances when would you anticipate this - the next two or three days - the next week or?

HUTCHINSON Getting that stuff? Tomorrow morning we ought to have it. I don't know when the hell. They had a big rush order trying to get it all - you know the little girls have to listen to it and type it and all that. No, I would expect you to have that in your hands tomorrow morning. If fact if you don't you ought to ask somebody how come.

QUERY Well, I just check the one we got here and it is 2 or 3 days late. I don't know if this is what you get. We're supposed to get this but it runs kind of late.

SPEAKER Well, I'll refer that to my friend on my left.

SPEAKER Some of that does have to go through an editing procedure but there will be a rush put on it tomorrow. We'll try to get it in tomorrow morning.

SPEAKER Okay that's all. Thank you very much.

END OF TAPE

SPEAKER - you're introducing heat directly on that control valve.

QUERY Why, with all the problems you can expect with water, do they use water versus some other coolant that might do the job.

HUTCHINSON Well, the coolant loop, I'll let Steve answer that one about the water. The coolant loop is not water. It's a Coolanol which is a - I don't even know what Coolanol is. That's a trade name of some sort. The water loop, I think, and you can correct me if I'm wrong, but it's materials compatibility, basically. You got to remember this thing is going through a pair of underwear, with a bunch of little tubes in it. Rubber tubes in it, and it's hard to find anything that's not made out of metal that will stand up against things like Coolanol and stuff like we use in the CSM, Gycol.

SPEAKER Now, the thing is, if we had our choice of coolants, we would pick water, because the water has great-est removal capability of any of the coolants, okay. Then we use water in the suit loops because the materials there are compatible with water, and they give us our greatest heat rejection - heat transfer - water does. We have to go to a Coolanol mixture in the coolant loops themselves, because what your cold plates and all your electronics are mounted on as what Neil mentioned are just not compatible with a water coolant.

HUTCHINSON Like it makes them rust, for example.

QUERY To back off on the cooling thing and tell about the SAS panel for a minute. Are you real sure that you got eight good batteries, you've got an all up good circuiting in that area?

HUTCHINSON Since we got those SAS panels out the airlock module PCGs have just performed beautifully. Just the way they should have.

SPEAKER Scared us a little bit when it took us a long time to get them out. Gee - I thought - We thought for a while that number 2 was going to stay hungup because it just sat there and sat there and then all of a sudden away she went.

QUERY Have you gotten any of the 8 channel back from the EVA?

HUTCHINSON I haven't seen the transcripts but I understand they put a big rush order on the transcripts. Joe had some comments for us on the B channel which we did play back real time on the last ATM pass of the day. He had a heck of a time up there. You know we have screwed up their little checklist ditties that they use to run the panel with with so many modifications with this EVA and the power down for EVA and the power up and all the management we've been

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SPEAKER No, well, I guess this would kind of be expected, because the point in the loop you're introducing the heat, it does not go through the radiators before it hits that control valve first. You're introducing the heat directly on that control valve.

QUERY Why, with all the problems you can expect with water, do they use water versus some other coolant that -

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loop itself up.

SPEAKER No, we never would have gotten that cold, for the loop itself.

SPEAKER However, I just wouldn't want to crack any heat exchanger plates or anything like that. It's just not the smart thing to do. But I don't think - when he said "intolerable", I think if you put that in context, it would mean that we're in a situation that we have to correct, and we're sorry we have to wake you up to do it.

QUERY I'm a little lost on these loops. You - you use - you at one time tried to heat them up by turning instruments on and so forth, which didn't work.

SPEAKER Heat one of them up now.

Query Heat one of them. All right. So then, just by using the garments, you were able to very quickly raise the temperature. Does this mean that the water part of this, which is your biggest concern, apparently, that you don't want it to freeze, is separate or in different lines from the main cooling system? What I can't figure out is why you tried a variety of ways and it didn't work, and then all at once, in a matter of minutes, you had the temperature going up with the Goldberg thing.

SPEAKER Yeah. Well, there's two things - two - let me answer two questions about that. First, the reason that they're - you're getting two kinds of water mixed up. One is the water that's in the suit loop that we're using as the heat transfer. That is a completely separate thing. The other water we were talking about is the water that's being removed from the atmosphere in heat exchangers. And that of course is being condensed out of the atmosphere and put on these plates and wicked into a - into the condens - condensate tank, which is then plumbed into the big holding tank and then - and then downstairs. The thing that we were worried about freezing was the condensate removal system. That's the - that's the water we were worried about freezing. And the reason we were worried about freezing it is that they - the coolant loop, loop B, - the temperatures in that heat exchanger were down below freezing point of water when we finally took action. Now the reason they warmed up so fast - couple of reasons: Number one, that suit coolant loop could - could put a pilot heat in there real fast - faster than any electronic gear can. Secondly, it introduces the co - the heat in the loop at the right place - namely, upstream of this valve that's giving us trouble. All the other equipments are downstream of that valve. The suit he - the suit heat exchanger, the one that is taking the water and warming it up, is right next to where it comes in out of the radiators. Frankly, it surprised me how fast it took over. How about you? I was surprised how fast the temps came up.

SKYLAB II

through Jun. 7

SKYLAB NEWS CENTER
Houston, Texas

Post EVA Briefing
Johnson Space Center
June 7, 1973
3:38 p.m. CDT

Participants:

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Kenneth S. Kleinknecht, JSC Skylab Manager
Leland Belew, Skylab Program Manager, MSFC
Rusty Schweickart, SL-II Backup Commander
Dr. Royce Hawkins, Medical Director, Life Sciences

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PAO We have this afternoon William C. Schneider of NASA headquarters, the Skylab Program Director, in the center with the blue coat. On his left Mr. Kenny Kleinknecht of the Johnson Space Center, the Skylab Program Manager here. And at the far right, Lee Belew of the Marshall Space Flight Center, the Skylab Program Manager there. I think Mr. Schneider will make a brief statement and then we will go to questions. We will probably be joined shortly by astronaut Schweickart and Dr. Hawkins, whom you met yesterday.

SCHNEIDER Well, I guess I shouldn't say too much about how successful a day we've had because, in the first place you've probably all been watching it as eagerly as I have. And in the second place, we still have a couple of very critical functions that should perform today. As I left the Control Center, why they were still struggling a little with the - with the attitude control, in which they have to do to warm up the - warm up the panels. But, we are getting electrical power out of the SAS wing, which was successfully deployed. And we probably will struggle to get that proper amount of heat in there, but I'm confident at this point that we will do that. And all indications are that if we do get the proper heat in there, why the wings will deploy and we will get a great deal of electrical power out of them. Now, of course the thing that has us so elated here of course is what it means to Skylab. And it means a great deal. It will allow us to go off the tight electrical power management scheme that we've been forced to employ because of our power situation. And it will fundamentally allow us to go very close to what our original flight planning procedures were. And we hope to get back pretty much, from here on out, on doing the experiments much in the manner that we had planned previously. Of course, we sometimes lose sight of the fact, with all of the things that have been changed in Skylab, we lose sight of the fact that we've had one problem, namely the fact that we had an inflight anomaly during liftoff which has caused all of the other things that have occurred And while frequently we get up there to explain the many many things, the things that do go wrong, we sometimes lose sight of the many many things that have not gone wrong or which have been forced to be changed becaused of the original problems. For example, with the electrical power situation back close to normal, we expect to get right back on the preplanned EREP types of passes. All of the things that you have been following in the past few days on EREP are all directly

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attributable to our power management problem. And with that going away, we expect to have the EREP passes very normal and nominal. The equipment, despite the way it might have appeared sometimes from listening to the reports, the equipment, the EREP equipment is working, working well. And we expect not to have problems with 190, and 191, and 192. All of those things have been attributable to the power management problem. The same way with the ATM, with the exception of the stuck S082A camera. Why that has been working well, and our only problem has been in getting enough electrical power and crew time to do what we had planned. We have changed out as you know the 82A camera, so we are looking forward again to a good and full all-up ATM mission. Medical experiments? The hardware has been behaving very well and bringing us in all of the data that we had planned. We hopt to get back on our original protocol. It appears that if the electrical power comes up the way we articipate it, we will go back to our original preflight protocol of running M092s every 3 days, and things of that nature. Oh by the way, I may as well say that - perhaps Dr. Hawkins may want to amplify it later, but, we have had some results out of the M092 experiments, which are confirming the way we thought the crewmen would be behaving, and we want to explain that to you. The other experiments, we've had some of the experiments that have had a - minor problems here and there, like S183. But, for the most part all of our problems there, too, have been attributable to the medical (garble) excuse me, to the electrical power problem. So, we're feeling rather bullish right here. We think we're back on a fairly nominal - nominal mission. And with the relief that we should be getting from this electrical power, why we think we'll be in great shape.

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SPEAKER And with the relief that we should be getting from this electrical power, why we think we'll be in great shape. I guess I ought to take a few moments out to tell you that - how - how personally proud that I am of all of the guys who did all this. This was indeed a - a great team effort and I really mean that - a great team effort by the Johnson Space Center and the Marshall Center working together, developing the procedures, coming up with the methods by which we were able to deploy that tool - that beam. Just a - a wonderful team effort that to me was very gratifying. Of course I needn't tell you how - how great I think that inflight crew is, they get my - they get my - my medal for the year. I don't have any more to add.

PAO We do now have with us as you see, Dr. Royce Hawkins of the Life Sciences Division at Johnson and we're over, Rusty Schweickart, who demonstrated the procedures to you yesterday. I think we are ready for question; wait for the microphone, if you will. Jerry Bishop.

QUERY Dr. Schneider, with the power now coming in and even the arrays are only partially deployed, can you do a 56 day mission? Power. Is this enough to go - -

SCHNEIDER Well I'll let Lee Belew answer that, huh?

BELEW Partially, meaning where we're at now, we're about 40 percent out on 2 and 30 percent out on the other. On the other - the third one. Of course, this will give us additional power and that will in my mind allow one to entertain a not normal but a deviated - a longer duration. On the basis that we don't continue to see a degraded system in the ATM powers as we have seen, you know, up to now we've had some difficulty losing two batteries and one is down about half rated. We - we don't anticipate that to happen. We anticipate that those arrays will come out as soon as we warm up the hydrolic dampers. See their down way below 0 minus 20 - minus 30 degress now. And that hydrolic fluid is not quite a fluid at that temperature.

PAO Rich Ternal, here in the second row.

QUERY A - do we know yet whether all eight batteries have come back into use, or is it too early?

BELEW There all coming up, one started out it was almost zero when it started out and I noticed it came to about - two volts up to around - it's over ten when I left. It's coming up. The systems are sound. The systems aren't damaged, so they should come up as soon as they raise, as they are out partially, I think they'll be all right.

PAO Tom, you have the follow on Rich then we'll go to Tom O'Tool.

QUERY I just wanted to get clearification on how soon do you think we'll know, how much power you're going to

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achieve at the moment you put a gap, as I understand it, between 900 watts coming in and the 3000 you huped for?

SPEAKER Well.

SPEAKER Oh, I guess the way I saw that data, in Hawaii, it will probably be some time tomorrow morning before those - the rays are fully warmed up by our calculations. I wouldn't expect any quick answer on that. They should begin to warm up and that will be the indicator as to whether or not they are going to deploy.

PAO Tom O'Tool, and then we'll go back in the corner. Here in the front row, second from the left.

QUERY Question for Mr. Schweickart. Conrad, just before they went out of loss of signal last time, was beginning to explain what they did that let them cut that thing. Do you know what it was. It sounded something like they did - Kerwin did something to his tether which gave him some kind of foot restraint, is that what it sounded like to you?

SCHWEICKART Yeah, Tom what they - I jokingly pointed out to Pete that it was well designed EVA - because the commander had to put out a lot less energy than SPT. I don't think Pete quite caught the humor there and he pointed out that there was a reason for Joe using more energy which was that he had a - a considerable problem maintaining his position while he was attempting to hook the cutters onto the strap. And we did expect that to happen, in fact, that was the biggest energy user in the simulations under water also. The main difference was that we learned last night about the existence of a couple of coax connecters - electrical connecters at the base of the discone antenna which was not present in the - in the neutral bouyancy simulator. And as a result, we tended to utilize that area with our feet in the neutral bouyancy environment, whereas Joe had to avoid that, today. Now, the way he finally compensated for that was to take the tether which we had going from his chest down to the base of the discone which was purposely left quite long, six feet. And he halved it - he doubled it so it held him much tighter to that area. Now, we kept it lose purposely, because we didn't have that same stability problem there and it enabled us to get around - to range a little bit further. That's a rather subtle difference there and it was caused by some new knowledge we got last night.

PAO Way over in the right.

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SCHWEICKART - - it's a rather subtle difference there and it was caused by some new knowledge that we got last night.

PAO Way over in - we'll go here first and then we'll go back to the corner.

QUERY We were told that the panels are now opened. Two are open 40 percent, and the other one 30 percent. The electrical power that you are getting from the panel Thursday are opened now, is that a normal wattage you are getting or is that less than what you expected it to be?

SPEAKER There is no abnormalities coming out of the data right now.

QUERY Rusty, in your explanation yesterday afternoon, you seemed to feel that the crew would have a much easier time than you had, or that they had the advantage of zero g, and yet they seemed to have considerable problems up there. Did everything go as you expected it outside of what you just said?

SCHWEICKART Pretty much. The main difference that we are able to identify so far, of course as you know, we weren't able to, and didn't intend to keep talking with them as they were doing the job, and we really have not had a debriefing with them yet. But, from just listening it appeared that there were some electrical wires which impeded them putting the cutters down along side of the beam in quite the same way we had, and also the strap coming across the beam appeared from Pete's discription to be the full, the full seam on the meteoriod shield, where as our photo interpretation had indicated that the large flange on the one angle bracket there would be missing. And so in that sense, we probably did not simulate the worst case. And I think they ran into the worst case and tried to hook the cutters on. But, once they got the - once they got the cutters hooked on, it appeared that everything from there on went almost identical with the way we expected it to, and from all appearances, fairly simple and straight forward.

PAO Jerry Bishop again.

QUERY Rusty, Conrad talked about that single lousy little bolt rather than a strap of metal. What was the reference on the bolt?

SCHWEICKART That was the, the strap that wrapped up along the top of the beam has protruding through it a bolt which hold the, which make up the meteoroid shield seam. And it's exactly what we expected, that one or more of the bolts that go through those straps was jammed down into or through the surface of the beam. And what Pete reported that it was only one of those bolts. It was just 1 measly little bolt,

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as he said. And evidently just the end of it was actually caught, but it was securely holding that beam down.

PAO John Willfred.

QUERY A couple of questions, one for Dr. Hawkins. Did at any time the astronauts become fatigued or do you have to order them to rest, just how did it go from a medical stand point. And also I guess for anyone. Is the TV of the parasol, were you able to get a good look at that to see anything, give us any report on that?

HAWKINS Okay, I'll take the first question then. No, we did not have to direct any stopage in their work. The Science Pilot did work at some fairly high BTU levels keeping it at times as much as 2500 BTUs of work load, and heart rates up to 150. But, he did not exceed what we consider to be a limiting heart rate level.

HAWKINS Well, I said that there were some peaks of momentary. This would say over a minute or two. It would peak up to 2500. The average BTUs, which are really more significant, the average for the entire EVA period, for the Commander it was 1080, 1,080 BTUs, and 1700 for the Science Pilot. The average heart rate for the Commander was 96 and 118 for Joe. Yes.

PAO Okay, there was another question - -

SPEAKER With respect to what we could see, the condition of the parasol from the TV, you could say there was very little. You could say that there was something there, it appeared that it may be shiny. But we did get a report. It was put on a dump tape. Joe Kerwin observed and did give a detailed discription of what it looked like to him. If you recall, the question was asked about that. We lost it at loss of signal and they reported that it was on a dump tape. I don't know just when that tape will come in here, but I believe that we will get a good description of it then. It's obvious that the parasol is affected. There can't be much damage to it and there can't be very much deformed or we wouldn't have the temperatures we have now.

QUERY Mr. Schneider, does this mean that the alternatives that McDonnel-Douglas and Martin-Marietta were working on for SL-III and IV are going to be discontinued?

SCHNEIDER Well, we haven't made any decision on that. I'm tending to believe that perhaps we might continue at least one of those efforts a little bit longer, just in case the CBRMs have continuing problems - -

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SPEAKER -- are gonna be discontinued.

SCHNEIDER Well, we haven't made any decision on that. I'm tending to believe that perhaps we might continue a least one of those efforts a little bit longer, just in case the CBRMs have continuing problems. It might be a useful thing to have in our hip pocket. We have not made that final determination, but at least I'm not of a mind right now that we should terminate all activity.

PAO Reg Turnal.

QUERY Could I go back to Rusty, and what actually happened out there on the beam. I may have missed it while working, but I've not heard Conrad or anybody say anything about whether he actually used the rope and the GEN POLE MODE. Could you tell us whether you know about that?

SCHWEICKART No, Reg, I can't. Unfortunately I don't know either, for sure. I do know that the BET is attached at both ends, because he reported - Joe Kerwin reported before leaving the area that he had taken the slack out of it, but had not put a great deal of tension in it, which was the end condition which we were shooting for, with the beam erected. He therefore, obviously had it connected and my guess is that he did use it, but I have no positive indication of that. He did mention, I believe, that the bracket did break. That is, that they did break the bracket. And I'm sure that that's the technique that they must have used. I can't give you positive assurance.

QUERY Then one has a feeling that this beam came up rather faster than you expected. That's my interpetation of what happened. That he might have had to move out of the way fairly smartly. Do you think that - there's anything in that?

SCHWEICKART No, I'd like to know what data went into your computer to come up with that conclusion. I found nothing that they said which gave me that impression at all. Don't have anything contrary either, but I don't have anything indicating that.

PAO Angus McPhearson. In the jacket there. Back one. Back just one. Then we'll come up again.

QUERY Whether you go - for Mr. Schneider - Whether you go with the extra solar equipment or not, this - I take it this has no effect on the advance launch date of SL 3, and will you continue to look at advancing the date of SL 4?

SCHNEIDER Yes, in both counts. We picked the 27 th of July as a most probable launch date on Skylab 3

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We have not yet picked a date for Skylab 4. We, in all probabilty will pick a date earlier than we had previously planned. Just which one, I'm not prepared to state yet.

QUERY What I was going to ask was this, you have a description of the parasol on tape up there. Do you have a discription or the conversation during the deployment of the SAS of the wing also on tape that will be played back later?

SCHNEIDER Yes, all the conversation will be on tape. They are played back and they are available.

PAO Lee Hicklyn

QUERY From the mission commentary that I could hear, I couldn't tell whether Pete attached the rope and stood up under it to pull the wing out in accordance with the procedure. Do you know whether that's what he did.

SCHWEICKART That's what we just answered. There is no positive indication that that's the technique he used, however it was the one reccommended and there was no counter indication.

SPEAKER There was no planning for anything else.

SCHWEICKART That's also true.

QUERY Rusty, you said just about - short time ago that in conversation with the crew, not to go into normal ATM configuration, and you also, I assume, jokeingly said, Pete said, what do you have for tomorrow, another EVA, and you said, we're looking at everything, or something to that effect. Could you speak to both of those?

SCHWEICKART Okay, on the first one, we are, because of the fact that we have only partially deployment of the panels, and also for that reason are off 45 degrees for solar inertial, at least for the next few minutes, we do have a power limitation still, until we get the arrays all the way out and back to solar inertial. And for that reason we are not powering back up, until after this thermal - this heating on the damper actuators on the panels, and that was simply letting them know that when they went through the post EVA checklist to go through to the E period and then just stand by for further reccomendation on the power profile. On the second one, you're exactly right, that was our means of saying that they had done a good job, it was very dramatic and that we may have to think of something - scratch our heads quite a bit before we can get equal drama for tomorrow.

PAO We have one minute and then -

QUERY Rusty, speaking and for Dr. Schneider, I guess, speaking of something to do, the crew seemed to be getting somewhat testy there for awhile, and there were some comments made. such as that's the trouble with this damn bird, nothing works right, or whatever was supposed to be normal, isn't, and something along the line of the line of the ATM is all screwed up. I didn't catch all of that, but, just what kind of a normal flight is this when the crew is -

SPEAKER I think that is a lot more than what was said. You ought to be a little more accurate in what you try to quote.

QUERY Well, I did catch a few of those remarks, and I believe that's what he was referring to.

SCHWEICKART I don't think he was referring as much to the vehicle, as he was to the fact that in trying to take care of everything coming up to the EVA there - since this was the first EVA that we have done, we obviously were learning some things about the systems, as we approached the EVA, and we - because of that - we were passing up messages to them. And it appeared, obviously, from their point of view, that we were changing things back and forth. And I think that, after seeing so many messages come up, they were beginning to wonder when they would end. I wouldn't say that that was the least bit unusual, either the fact that we were forced into updating them, or that they were wondering when we would stop.

PAO Tom O'Toole.

SPEAKER Let me say a little more about that. The systems have performed outstandingly in this whole vehicle, and as Bill pointed out earlier, the problems we've had are primarily, and almost exclusively been associated with the incident that occured during launch. The food is good,- -

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SPEAKER is primarily an almost exclusively been associated with the incident that occured during launch. The food is good, the food preparation is good, their happy with the shower and Pete was referring more to procedures. There was a lot of effort that went into the procedures for deploying this SAS array. There was less effort went into the procedures for going out to the ATM and working, he was more referring to the procedures for that ATM activity. We're not as well any specifically said. The procedures and everything is going well on the EVA with respect to the boom deployment and I think overall, Pete and Joe and Paul were very cool through this whole operation. Went very smoothly and they seemed like - it was obvious they knew what they were doing. They proceeded slowly and deliberately.

SPEAKER I'll say again; I'm not in the lease bit ashamed in the way the Skylab equipment has been working, but the thing that - that - the thing that I like to reflect upon is if we hadn't had that first incident which obviously was - was - something that we're going to have to look into and indeed are looking into. It hadn't been for that we would have had a mission that would have been just been going as far as I'm concerned letter perfect. Everything has been directly traceable to that except for minor things that really aren't major - major consequences.

SPEAKER And also, if we hadn't had man there, there would have been no mission following.

PAO Tom O'Tool and then Nick Chris.

QUERY Huh, for Rusty. One point, Conrad and Kerwin were deb - early in the EVA debating about something. Kerwin wanted to do it one way and Ke - Pete told him to do it another way. Kerwin finally said I'll try it and he said then yeah it works even better than I thought it would or something like that. Do you know what they were talking about, do you remember that exchange?

SCHWEICKART I remember the exchange, Tom, but I frankly have forgotten exactly what the subject was. I believe it was something about the positioning or something of that kind, but I don't - I honestly have forgotten what it was about.

PAO Nich Chris

SPEAKER At one place, Joe was going to move out towards the beam before we had the pole out and Pete said, "No, we're not going to do that."

PAO Nick Chris

QUERY How big or how thick was that lousy little bolt, can you tell us?

SCHWEICKART Nick, I - I had one with me, yesterday. (Laughter) I don't -

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SPEAKER You had a piece of metal.

SCHWEICKART Right and if you look thr - if happen to look closely at that piece of metal, the bolt was sticking through that. I had a couple of bolts in that section and that's what they are, Al.

QUERY So about a 3/16th of a locknut and it sticks out about less than a quarter - about 3/16th beyond the long nut?

SPEAKER Like that.

PAO Lee Hickling.

QUERY Probably you don't want to get ahead of the board that has been appointed to look into this but can you tell us what you do know why that accident might have happened?

SPEAKER Well I guess right now we - we ought to wait for the board - I think that they had an organizational meeting last week in Washington and there meeting in Huntsville in - on next week. They do - they do hope to have a final report out in a couple of weeks obviously the investigation of the data has been going on at Huntsville in - in quite an inergetic manner and I think we'd be presumptuous to - to speculate on what they might find as being the cause.

PAO Okay, the gentleman in the blue shirt, and Jerry Bishop.

QUERY I have three questions, this time. First of all I would co - I would like to go back to that lousy bolt. Is that bolt the cause that - the solar panel didn't open. Is that the thing that kept it stuck?

SCHWEICKART Well, the - the strap - the aluminum strap that was up over the top of the beam which did prevent it from deploying was as far as know from what Pete has said so far the only thing which was holding the beam down. Now there is always a possibility there was some other minor obstruction, but evidently that was what was holding it down. Of course, the bolt was put there because of the original incident which was the - the meteoroid shield coming off during lauch. But what that resulted in was a aluminum strap over the top of the bolt sticking through it that snagged on the beam.

PAO Jerry, if you will take ten, oh you had a follow on?

QUERY Yes, I have two more questions, I'll ask them together. First of all, were there any reports effort that somebody found part or piece of the solar wing that came off of the meteorite shield - that came off? And the second question is, will there be - will you try to catch up on the time you lost on the experiments?

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SPEAKER I know of no debris, if that's what you have reference to. I know of nothing being found. I'd say, no.

SPEAKER We had a full bull flight plan, when we lifted off and I can't think of any way that we can do more that fill up the tank. I would not anticipate picking up very much; it's conceiveable that we might be able to find an opportunity to do a little bit more, but you know the crew has asked to work on their day off. We have not yet given permission for that beyond tomorrow. I - we want to wait and see how their health is, so it's possible that we might pick up a day or so but I wouldn't count on it. Hopefully, we'll do as much from here on out as we would have done in a full days activity.

PAO Dr. Hawkins has a comment he'd like to make which occurred to him and then we'll resume the questions.

HAWKINS Okay, well, Bill Schneider mentioned this a little bit earlier about the M092 experiment and that he'd like me to elaborate a little on - further on it. This is certainly in line with - with the conference we had with several of you that are here this afternoon. You recall yesterday when we tried to update you on where we stood on the M092 and H171 studies. This is by way of a little bit

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SCHNEIDER - - the M092 and M171 studies. This is by way of a little follow on to what we were talking about at that time, in that yesterday with the, with Joe Kerwin, we saw the second change representing the adaptive process that was going on with the crews from a physiological stand point. The first you recall we mentioned yetserday that we had noted was very early in the initial M092 runs where the - we detected changes in the leg volume. And you'll recall what we discussed there. Now then, yesterday, while Kerwin was undergoing the M092 during the max stress level of minus 50 milimeters of mercury pressure, we did note a rise in his heart rate and simultaniously with that a drop in his blood pressure to a threshold level where we, where we had to terminate that run by 3-1/2 minutes into, into the protocol time line of that maximum stress level. And so this has flagged another adaptive type of change which we have expected to see, the same type thing which we have seen in some of the post flight experiment runs in the Apollo program where we would evaluate the crews in the immediate post flight period seeing similar type things. Now, what this does for us then is we will reduce the maximum stress level as we did yesterday to a 40 milli-meter mercury negative pressure for Joe Kerwin. I rather anticipate that the level of stress exposure might very well be modified for the other two crewmen and we anticipate that this does not in any way certainly alter the inflight activities that the crewmen will be engaged in. And I think the days activity that we saw certainly bares that statement out.

PAO We had a question waiting in line down here, I believe.

QUERY Yeah, the crew mentioned there were electrical wires and some other associated debris out around the beam. Were those wires associated with the shield it-self or were they coming around, and whipping around from the other side, from the other solar wing?

SPEAKER We kind of got that one too in real time and setting there figuring out where they came from. We have wires and we have sensors on that micrometeoroid shield that we lost, and I epostulate that those are the wires that remained onboard or on the spacecraft after the shield left. In that they would have - they were there at the beginning, and that's the only source that is available that could produce such a, such a wire.

QUERY A question for Dr. Hawkins. You're talking about this adaptive change that you expected to see and you're reducing the maximum stress level during the test.

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Does this mean, as far as the laymen is concerned, that at present under the conditions up there, there general level, their capability is slightly less than it has been?

HAWKINS Well, it means that, that what we are seeing is a change in the physiological performance, capability of the man, if you will, to the environment that he is living in. And as we have seen in the post flight periods of the Apollo studies, we have noted this degradation of the cardiovascular response. Now what we're seeing then is the real time happening of that, and at what period in time apparently these things are taking place. Now we, now this is what we say we've expected to see, and we didn't know at what point in time we really seeing this change. Obviously some of it is occurring early, as with the leg volume measurements, and now with the threshold levels of the cardiovascular response to the negative gravity, negative pressure, this is a further indication of the changes that are actually happening. Now, I think that, let me make this one clear, I think that this is telling us that the man can perform just as he is expected to do and has done in the weightless stage. It is going to tell us and it tells me that we are certainly going to expect to see something in the immediate postflight periods, that is going to be a similar response or maybe a little more.

PAO Barry Cosebolt.

QUERY Mr. Schneider, I wonder if you could set for us how you feel as far as the success today, how it made impact on future manned space flights, or manned space programs?

SCHNEIDER Well, as I've said repeatedly, I won't make any statements as to whether Skylab is successful or unsuccessful until around the first of the year when we've finished all 3 missions. I am well pleased with the ray of success that we have had right now. Obviously we had a problem which caused us to retrench, and I certainly couldn't say that we have done all the things that we've wanted to. I think from here on out the prospects are very good. As far as what the prospects are for manned space flight, I, everybody has their own opinion, but at least in my opinion I don't think what we've done here in Skylab has in any way detracted from manned space flight or from space flight in general. I think we are, we have gone a long way at least to prove - -

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SCHNEIDER - manned space flight, or from space flight in general. I think we have gone a long way, at least to prove to me what I have always felt - and indeed really knew without proof - that is, that space is a place where you can live and work and you can do useful things. We in manned space flight, and indeed in NASA in general, have for a long felt that man is a useful animal to have around to help repair, even on manned vehicles. And I think we have again shown that , at least our concepts are not without some foundation of fact, that you build things to be fixed, they can be fixed, and indeed here, even in the solar array, there was an item which hadn't been built to be fixed, and man with his great computer that he's got between his ears, was able to figure out a way to do it. And I don't mean the men on the ground, although they - those computers were excellent, it took that man up there seeing what the exact situation was and guiding that tool and working with his beautiful senses that he's got to really do it. So, I think from a Skylab standpoint, as I said before, I'm not the least bit ashamed of the program to date. And from a manned spaceflight program, I think we've kind of shown that, yes man does have a useful role, and from a NASA standpoint, we've shown that space is a place where man can do and achieve useful things.

PAO Angus.

QUERY Just as a matter of record, perhaps another ironic one, is it not true that your reconstruction indicates that without that lousy little bolt that you been cursing and hacking all this time, you would in fact not have had a SAS to deploy, that it would have probably have gone like SAS 2 went at launch?

SCHNEIDER Oh no, not at all. That wing was latched firmly in place, just as it had been planned to be, until we activated the pyrotechnics to release it. And it was only then, probably that the bolt got driven in or at least the bolt got stretched. Let me say that I think the effect of that bolt, and again, it's a speculation, without having had a detailed crew debriefing, the effect of that bolt probably prevented Paul from prying the strap loose during the standup EVA, at least probably went a long way towards that, because it was kind of an anchor to the strap that was over there.

PAO I have one question phoned in, also for Mr. Schneider. Could you give an evaluation of the experimental data to date, especially EREP and the solar, any special discoveries to date?

SCHNEIDER Well, let me let Mr. Kleinknecht talk about the acheivements on EREP. They have been great, but I think he can give you a little more detail.

KLEINKNECHT All of the EREP sensors are performing as we expected. There have been some procedural changes, again, because of the heat. We have to use more power. The problems we've had with EREP have been associated with trying to compress the time and the procedures to get them operating. As of yesterday, I believe, we had planned for that part of the mission about 100 - having taken data on 160 test sites. We had taken the data on about 90 test sites. But we have gotten some data for every category of experiments that were being investigated. We now, if we get more power, we believe we will have a better chance to get more data from here on out. If you will recall, we were restricting the passes to a few degrees, rather than the 120 degrees, and because of that, we were not able to get data over the states. From here on out, if we do recover the power that it appears we will do now, we will have some more good EREP passes coming up later on in the mission.

HAWKINS As far as the solar experiments go, I'm sorry Lee Belew had to leave to catch an airplane. He should be more appropiately answering that, but the data on these solar experiments is, of course, all recorded on film, and incidently of course the EREP data is all recorded on film and tape, and we don't have any real examination of that data. Back to the solar ones again, only one experiment brings us data back live, and that data has been very exciting, exciting for the principal investigators. The principal investigators are delighted with the performance of their instruments and with the television data and the RF data - limited RF data that they are getting. The proof of the pudding is obviously going to be after they have had a time to analyze the pictures and to see the details of what their investigation is showing. They have had less viewing time than they would desire, and as has everybody. Then of course, this again was brought about by the power restriction. And we hope and they hope that we'll be able to up that viewing time and get back on a normal viewing schedule.

PAO We'll take about one more, then let these men go back to the control center to see what's been happening since they've left. (garble) you have one more.

QUERY Okay, I wonder if - to whoever's gonna answer - whether or not you've learned yet, or learned anymore about the causes of failure of the batteries in the ATM?

SPEAKER Well, we can speculate right now, and

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our speculation is that it's all due to the high - the unusual thermal conditions that they saw during that unmanned period while we were trying to get back up there with the thermal shield. Nicad batteries don't like to work hard, and they don't like to work hard in the Sun, when they're hot, just like you and me --

END OF TAPE

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SCHNEIDER - - nican batteries don't like to work hard and they don't like to work hard in the Sun, when they are hot, just like you and me, and we made them work hard and we made them hard while they were hot, and they have protested. And four of them, the four that were hottest, are indeed the laziest. There some indication that there is some recovery in them. We would have expected faster recovery than is being exhibited. And that's about all I can say. We've worked them in an unusual manner and they didn't like it.

PAO Thank you gentlemen.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 6, 1973
7:01 p.m. CDT

Participants:

Milt Windler, Flight Director, Maroon Shift
Don Green, PAO

SL-II PC-31A/1
Time: 19:01 CDT
6/6/73

PAO Good evening gentlemen, we're ready for the night's Change-of-shift briefing with Milton Windler, who is the off-duty Flight Director as the star of tonight's performance. Milton on my right, go.

WINDLER Okay, well, today was spent, as you're probably already aware, in - mostly in preparing for the EVA. We had a fair amount of time devoted this morning to making that preparation. There was also some time about three hours ago that was devoted to getting all the gear stowed up in the airlock module to get ready for tomorrow morning's EVA. And in between we did do some science work. We photographed the hurricane - the torna - what do you call them in the Pacific? Typhoons. Ada and also did ATM work and some corollary work - made an S019 run. So, tomorrow we have - well tonight let's talk about that. I expect the crew to continue their preparation just like they did last night. They actually got a lot of the gear out last night and had talked about it. And this morning they were obviously trying to stay ahead of the game and were well squared away and had gone into the hardware and had gone into the - looked at the procedures and had a real good idea. We were very pleased with the fact that they were so well ahead of the schedule that we had set as you might say. So, tomorrow morning they'll be waking up at the normal time and we do have a shortened post-sleep period, primarily because there are several things in a normal experiment operations that we won't have to do - some things like film threading and activity like that. The EVA prep will start - if y'all got this from Rusty you'll have to excuse me but it'll start approximately at 7:40 in the morning. We expect the hatch to open around - and I'll have to translate this - that's 19:35, that's 12:35 - I'm sorry, that's close - that's close - I've got another one of these things that's mixed up. I beg your pardon. Yes, at 15:35, which is 10:35. And we're trying to open the hatch just before sunset and let the crew do activities that they need to do in the lighted area around their normal EVA station. And also around on the - about 9 degrees away from that station in an area which is lit up by the docking lights. And then we hope to get that all done before the next sunrise and actually give them some time to rest. And then they actually start the activity towards the SAS wing at daybreak and that gives them a whole daylight pass to do their activities. And we'd like to have them done with that by the end of that pass and able to then rest to gain in the next night period and if they get rested, to also do the ATM work, changing the film. If it happens that that doesn't occur til night time is over, then we'd go ahead and maybe do some of the visual work that we have to do. Look at the quads and get an idea of the colors on the parasol and things like that. We actually, though, have another pass allowed in the flight plan for the crew to do the activities that they need to do, so there's nothing magic about trying to do it all in one pass. And as I've already said, the close hatch time would be around 12:35 and then they do a little EVA - post-EVA activities - take some time to eat, finish the EVA activities. And we have an option in the flight plan for a couple of ATM runs, which we would do if we felt like - or the crew would do I should say, if they feel like that they're up to it. And we'll just have to wait and see how things go tomorrow to decide on whether we'll actually be able to do that or not. We also, you probably are aware, that there's some concern over whether or not the panels, once the wing is erected, whether or not the panels will unfold properly. We think they will, but there's some chance that they might be a little bit slow and that they might cool down such that we'll need to make a 45 degree maneuver to warm them up, and we'll just have to wait and decide on that after we see how things act in the morning after the wing deployment and the crew tells us how the panels are actually unfolding and as we see the instrumentation on the panels. And other than the EVA tomorrow it's going to be a nice quiet day.

PAO Okay, do we have any questions?

QUERY If you have to cool down the panels - I mean if the panels cool down you have to heat them up. What will that do to the temperature of the workshop?

WINDLER I don't think it will change it very much because the response of the thing - of the structure is slower than the response of the wings itself, and also, of course the parasol will shield us to some extent - fair extent in fact.

PAO Angus.

QUERY You have reminded me of something that perhaps we ought to have asked Rusty, but if you should have to do this maneuver to warm up the wing, what would the crew - -

END OF TAPE

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Query - - Rusty, but if you should have to do this maneuver to warm up the wing, what would be the crew's status be during this. Would they have to be in their restraint or would they have to be back in, or what?

WINDLER No, I don't think there is any restraint on the crew activities there. We would expect them to be in the area of the hatch.

QUERY Could we - do you have available a run-down of the electrical power usages for today; what exactly has been, you know, how much power has been used for what experiments?

WINDLER Today?

QUERY Well.

WINDLER Gosh, I guess I don't. The - let's see the SL19 doesn't use very much power. We did run the ATM today - that uses around 550 - 600 watts. We didn't do - well we used - did turn one EREP instrument on today in addition to taking hand-held camera pictures. And that's a 193 and I'd just have to guess at that - at around 100 - maybe a little bit - around 100 watts, I'd say. If you need a precise number we'd have to call back over to the control center and I'm trying to think - let's see, the ones - we did a 171 run today also, the medical bicycle thing and I'm not real sure how much - that's a fairly high-powered user too, but I've forgotten the exact number it is. It's not as high as ATM it's something less than that but it's fair.

QUERY Can you tell us the status of the CBRM 17, now.

WINDLER 17 is - is doing it's thing during daylight like it's supposed to in recharging the batteries. It is down somewhat in performance although it's - it's certainly very useful and we're just - I guess it's more like we're watching it with a suspicious eye or a jaundiced eye, whatever you want to call it rather than it's - you know it hadn't - it hadn't quit at all. It's - it is still producing power and recharging the batteries every rev.

QUERY Milt, the TV is definitely out at the end of this EVA or looking out through the command module window?

WINDLER Yes, unless the - something changes the crews mind, they felt like it would be difficult to stow, you know if we are restricted in the amount of equipment we can get in the - the volume that we're dealing with. So that's one problem is in stowing the gear inside the airlock compartment. And also they had tried previously working with the TV outside, it has a fairly stiff wire on it, it is very difficult to work with and since we've already had one camera that's inoperative, it was felt - the crew felt like that it - because of the stowage difficulty and the difficulty of working with it plus it's an unknown to them - it's an unknown EVA path and activity plus the fact that we're down to our last camera they felt that it would be best if we did not try the TV and we only wanted to do it on a noninterference basis anyway so we agreed with them to not try the TV tomorrow. Now, they could change their mind I suppose, but I consider that very unlikely.

QUERY How many, - there are two TV cameras, that of which one is now - one is now out of action.

WINDLER Yes. two TV - two color, portable color, TV cameras and one is - yes you're right. And I don't think we've tried to trouble shoot that. Most people I've talked to I didn't ask that particular question today, but it's - very doubtful if we can do anything with the one that is broken. We never give up though until entry.

QUERY Do you have a - a kind of summary time line of what they are going to be doing, when. The last I've got for an exact time is 10:35 A - hatch open.

WINDLER Well at 10 - oh, okay. You mean - I can give you the - we don't know what the exact time is going to be of course. Since you know we're not - Go ahead, Don, you want to say something.

QUERY Well, if you have any vague times as to when - vaguely when Conrad is expected to move down toward it, sunrise or sunset, acquisition time.

WINDLER Yes, do you have that? Okay, the time at which we think they will have all their gear in place and be ready and which coincides with the first sunrise is 16:13 which is 11 - 11:13 Central Daylight. And that's the time at which he will start moving down towards the - they'll start engaging this thing that we call the cutter device to - to just to clamp - as a clamp to clamp on the strap and then we'll use it as an EVA clamp. And then that - there's around a - almost a 1-hour period there in which we expect them to get out to the SAS wing, engage the bridle and secure that, and readjust the cutter to a point at which they can cut the strap - cut the strap and raise the wing. And of course come back into the - in other words get their equipment back into the airlock module. We think they can do that in an hour. It may not work out that good of course.

QUERY Now, supposing - supposing the wing is open and the panels deploy and that will make available - that - the energy from that will come - go into a separate set of batteries, won't it.

WINDLER That's right, that's the first thing we want to with that energy is to recharge those batteries.

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As opposed to say you know start using it right away. I mean for the things we want. There's really no conflict there because we don't need the power right away, because the crew's EVA they don't have any requirement for the -

QUERY But these - this is a totally independent set of betteries?

WINDLER Yes.

QUERY Right? There are 18 of them?

WINDLER No, there are 8.

QUERY 8 of them.

QUERY If you could go on with that time-line, when is the sunset and when are they back and when are they going about -

WINDLER The sunset is 1 hour later than I talked about that 7 - that's 12:10. The sun - the first sunset, then we plan for - I'm sorry Central. Then we plan for them to spend some time resting if they require it.

END OF TAPE

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WINDLER - then we plan for, I'm sorry central. Then we plan for them to spend some time resting if they require it. And if they do get it done that way they will - they can go ahead and do the ATM film changes and the door pinning, because there are lights up there and they have practiced doing these in the night time. There's no restriction there. And then we would do the activities that have to do with the observation of the parasail and the RCS QUAD, and there's one other one, which escapes me at the minute. What is the - Oh, looking at the other wing to see if there's any debris there that might interfere with perhaps putting a cable in later on, at another mission. So, that would happen in the daylight on the next pass or if they don't have the wing deployed - now the next daytime is 46 - 12:46, and then we would have that day period to either work on the visual things or we could continue working on the wing, if it was required. All through that next cycle, day cycle.

QUERY You have them back in, supposedly, originally on -

WINDLER Then we have another night cycle too, I didn't give you that one. We have a night cycle then, and a few more minutes of day, then we're inside. The way it calls right now.

QUERY You told us hatch close 12:35 p. m. Is that incorrect? Is it 1:35?

WINDLER I'm sorry. It's actually 14:35, so it's 2:35. You're right. I did tell you wrong. I'm trying to subtract all these times. I'd better do that right now, before I get too fouled up with you. Now, I'll even put myself -

PAO Okay, let's stand by for 1. (garble) have you got a question?

QUERY Just very roughly, in the present they're getting an hour's daylight and half an hour's night. Is that roughly -

WINDLER No it's - You mean total time? There's more time available than that.

QUERY No, No, on each revolution.

WINDLER Yes, roughly, right, right.

QUERY I was just working out your figures myself, and I may get 57 minutes of daylight and 36 minutes of dark. Does that sound right?

WINDLER Okay, well you can say it roughly.

QUERY Is Rusty going to be the Capcom tomorrow, and is there going to be anyone else special at the console?

WINDLER Yes, Rusty will be the Capcom. We expect

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Ed Gibson to also be there, who has worked with Rusty, and in the tank, of course, and the regular Capcom will also be there, Bob Crippen. And I expect there to be othere, also. But those are the main people that will be supporting the operation.

QUERY While you're doing that, I have an iffy question that was submitted to us from a correspondent at the Cape. And it goes like this: What do you think the odds for success are tomorrow in deploying that solar array?

WINDLER Well, I think that they're very good. The procedure has been worked pretty thoroughly in the water tank at Marshall. A lot of analysis has gone into it, as well as practical experience, so I'd like to think that we have a high degree or high probability of success. The crew figured 50-50. We figured higher than that. I don't know what you like. I'd say it's at least 75 and it's probably higher, but I don't even know how to put a number on it.

PAO Okay, (garble)

QUERY What, in your own terms, what do you feel the - what kind of stakes are riding on this whole thing, the success or failure?

WINDLER Okay, well I'll be glad to wait and do that. I feel like I've confused them so much with my numbers that I hate to - I'd hate not to go ahead and make those arithmetic changes. Okay, I don't - well it's not a do or die situation for the Skylab, because we're still able to operate and we think that if certainly the very minimum we'd get out of it is a much better understanding of the kind of equipment and procedures we would need to use for another crew perhaps, to go out or even another attempt by this crew, and I'm not saying that that's what we're going to do, but certainly at the very least going to learn quite a bit about what's happening, but we don't think that the failure to get this wing out would, you know, it's not going to eliminate the rest of the operations. We'd certainly like to see it come on out though. It would make our jobs considerably easier.

QUERY How many batteries can you stand to loe if that solar wing doesn't deploy, before they have to come home?

WINDLER Oh, I'd hate to guess at that, because everytime we lose some capability, we seem to come up with another way to save a few watts here and there, so it's a case of, as necessity demands, why people come up with inventions. I think right now we could stand to lose two or three more. It would certainly, of course, obviously greatly

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reduce our capability for experiments, in fact, when the CSM is - I don't - maybe we couldn't lose that many. I guess I'd put my faith in the ingenuity up to two.

QUERY In an effort to clarify this central daylight time. What we will do after the change of shift briefing is take the set of figures and make it in the form of an attachment to the change of shift briefing and by the time we're in print on that, why we'll have everything for you all. Okay.

PAO Okay, if there are no more questions, oh, got one more hand here.

QUERY Milt, after one of the other change of shift briefings you told some of us that you felt - this was after the announcement of the SEVA attempt to free the wing and the deployment of the thermal shield when it became obvious -

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QUERY - so this was after the announcement of the SEVA attempt to free the wing and the deployment of a thermal shield when it became obvious that that was necessary. You said that you felt that this kind of an activity, if successful, would be a justification for the shuttle. I just wondered if you - how you feel - the history, up until now, has borne that point out and what the implications of - you know, of this coming EVA are on that point?

WINDLER Well, I guess my point about the shuttle was that I think that of course, and I'm obviously biased here because I'm in the manned spacecraft business, but I think that the - what we have seen about this flight is the ability of man to compensate for unforseen events and to make the necessary corrections and of course one of the objects of the shuttle is to, if necessary, go back and make adjustments to satellites. We also were talking about in the shuttle program on a regular basis - ongoing orbital activity by men and many scientific payloads, you know, and a sort of an individual module fashion. I shouldn't say individual, but modular fashion. And that's what I've had reference to when I said it would help the shuttle program because I think it demonstrates what they can do.

PAO Okay, John, thank you.

SPEAKER I'll just leave this with you and I guess we ought to - -

EVA PRELIMINARY TIMELINE
TIMES APPROXIMATE

CENTRAL DAYLIGHT TIME	
10:00 a.m.	Communication Check
10:35 a.m.	Airlock module hatch opening
	(Entering darkness)
11:13 a.m.	(End darkness)
11:13 a.m.	Start sliding cutter edge toward strap
12:00 Noon	Solar Array deployment
12:10 p.m.	Stow rod and rest
	(Entering darkness)
12:46 p.m.	(End darkness)
	If necessary, wait until daylight and do parasol evaluation
1:20 p.m.	RCS Quad A inspection
1:45 p.m.	(Entering darkness)
2:35 p.m.	Airlock module hatch closing

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Medical Briefing
Johnson Space Center
June 6, 1973
2:34 p.m. CDT

Participants:

Rusty Schweickart, SL-II Backup Commander
John McLeaish, PAO

SL-II PC30A/1
Time: 14:34 CDT
6/6/73

PAO Okay, we're ready to start. We have with us this afternoon Backup Commander, Rusty Schweickart, and I'll turn it over at this time to Rusty.

SCHWEICKART Good afternoon. Let me start out by giving you a sort of end to end on the EVA, arm waving at the model here, and then run a 12 minute TV clip that we did that's an extract of the last one we made in the neutral buoyancy tank over at Marshall on Sunday, and I can narrate that while we go through it. And then perhaps just go right into a question and answer session unless somebody specifically wants something on these tools. I must say these tools are all of the tools we've been simulating with and using in the development are still over in Huntsville, Alabama, so that this is really a rather rough approximation of what we're going to be using. Let me start with the model here and first of all there are some things which are missing from these models which come into - into the game here when we start talking EVAs. And so there are a few pieces of metal and rubber bands and things hanging around which represent real things, even though they look as though they were put on at the last minute. The EVA will start in this quadrant which is normally - and I'm afraid I can't tip the model for you without bringing on catastrophe. But there's an open quadrant here without a thermal shield around it. This white material is all thermal material with the exception of this EVA quadrant. Down inside the EVA quadron is the Gemini hatch, the hatch that we used back in Gemini which is part of the airlock module. That's the normal planned exit for EVA film retrieval. And we'll be coming out into this quadrant in a manner identical with a normal film retrieval EVA. We will be using two crewmen. Pete Conrad and Joe Kerwin will be performing the EVA and will be referred to and you've probably already heard us refer to EV 1 and EV 2. Because of the fact that we - all three crewmen actually go EVA on later missions. Not at the same time but they rotate around. Rather than try and designate specific people, we talk about EV 1 and EV 2. And EV 3 is the fellow who remains inside reading the procedures. So we kind of mix up things here on these designations. The role of EV 1 in tomorrow's big production will be played by commander Pete Conrad, and the role of EV 2 will be played by our inflight scientist surgeon, Joe Kerwin. It'll all start at sunrise - rather at sunset. We'd like to come out into the EVA bay here, open up the hatch at sunset. And I think the time is 15:37 ZULU. Someone could check me on that. We do that in order to take care of all of the preparations - the EVA preparations that are done outside now during the

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dark phase, so that we have a maximum amount of daylight when we start to go down on the side of the vehicle to raise the SAS wing. The first operation that takes place as EV 1 comes out into the normal foot restraints in the day here. EV 2 passed out some equipment, what we call beam erection thether or a BET. And also he passes out the poles which make up the long cutter rod. Those poles will then be assembled and will project out in this direction that I'm - that I have my pointer here. Excuse me, should go down here in this direction. The length of that pole is about 25 feet and I have cut this to approximately the right length. So that will sit down here and be tethered at that point. And then EV 2, Joe Kerwin, will move up across the - the bottom of the MDA underneath these trusses, underneath the deployment assembly trusses, to this bar that I've put on here which we call the A-frame. Now let me point out what you've got here.

END OF TAPE

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SCHWEICKART - - bar which I put on here, which we call the A-frame. Now, let me point out what you've got here. Sticking out and missing from the model here is a discone antenna. We've represented it with this piece of bus bar and that discone antenna normally lays down in a tray, which is mounted vertically on the trusses here. This crossmember is what supports that tray during launch. So what Joe does is come along the bottom of the MDA, underneath and upon to this A-frame. At that point, when he's up there, Pete will pass the cutters up through the trusses to Joe, who'll keep them up and hold them out here. At that point, Pete will then come on out bringing the beam erection tether with him, the BET. I'd like to have the freedom to call it the BET instead of going through all 3 words, if I may. So that then is represented by this elastic band, but, oops, I almost ripped up the model there. Let me just lay that back in there at the moment. At that point in the EVA then, Joe will move up to the base of the discone antenna, here right on the FAS ring at the forward end. And they'll rest at that point until Sunrise, if it's not all ready - it hasn't all ready occurred. The reason for that is that the side of the vehicle down below here where we'll be working, of course, is not illuminated at all. There are no lights, whereas up in the normal EVA areas we do have lights for lighting up the EVA trail during the night. So at this point they'll hesitate until sunrise and the first operation of sunrise will be to run this cutter - to lay this cutter down along side. And you have to recognize that that wing isn't there yet - to lay the cutter down along side the SAS wing, and by using the jaws on the side - let me just take this model out here. This is very approximate, I want you to realize, but the jaws will be open like this. This will be at the end of 5 rods. We'll run it down the side of the SAS beam, and where you've all see the photographs of that aluminum strap that comes up and is restraining the beam, keeping it from going up, the cutters will be placed over pass strap and tightened down. Not to cut it now, but just to grab hold tightly. And so this rope then that is used to hold the cutter tight will then be cinched at the other end of the cutter pole. At that point, and of course at the back in here, the pole is also tethered up here at Joe's feet. So what we now have, is a handrail in effect, which lays down from the base of the discone antenna alongside the beam. It's actually holding onto the material that we hope to cut. Now the length - this is about 27 feet, or something on that order. At that point Pete will - who's already hooked up the end of the BET to this A-frame, will then begin to deploy that. It's hooked to his right wrist. And he'll move down the hand - this set of poles, this handhold -

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He'll move down the beam with his feet down in that direction, his head up, belly down. In other words, he'll be facing the beam as he goes down hand over hand. You'll see this in the film clip. When he gets down here he has to hook the other end of the BET into a vent module, which is located on the surface of the beam, and I could draw that in here, but there are three vent modules on the beam. And one of them is located just about opposite where this debris is located. And we hooked the bottom end of the BET, 2 hooks there into the vent module. There are some very small holes in that vent module which will allow us to slip in these hooks. And Joe will then take the slack out of that tether, out of the BET. Okay. That's the getting down there part. Now the next step once you've taken care of getting down there, is to cut through the strap that's holding it down. That'll be done - We have several different ways of doing that. The preferred method and the one which we'll try first is simply to go ahead and clamp the rest of the way on these cutters and cut right through it. Now that'll be done by Joe pulling on that rope to cut the aluminum and Pete at the same time, will be out on top of the beam, laying across the beam, holding onto the cutters here. So that he can - he stabilizes him out on that end, while Joe pulls on the rope. And hopefully, we'll cut right through the aluminum, and that will take care of the cutting. Now if for what ever reason that doesn't work, we have two other methods that we feel - -

END OF TAPE

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SCHWEICKART - - will cut right through the aluminum, and that will take care of the cutting. Now, for - if for whatever reason that doesn't work, we have two other methods that we feel are both acceptable for getting rid of this strap. One of which is a pry bar, which will also be carried out with us. This is on - two of these in fact in the onboard tool kits. We have demonstrated all this under water, which you'll see. We take the pry bar and jam it underneath the debris that - the strap is coming up over the beam and then pry it off. That's one way that Pete has already expressed the opinion would work. The other way is to take a bone saw, which most of you have seen or heard about, and slip this bone saw underneath the strap and cut through it using the saw. Now all three of those techniques as I said have - have been demonstrated many times. Both in air and under water. And we feel confident that any one of the three would do the job. So that takes care of the second part which is getting through the strap. The third part then is to raise the beam. Now as most of you know the beam is not expected to come up by itself because the damper actuator and the upper hinge here is frozen. And for that reason we expect it to come - oh, to raise only about a foot at this location. It will raise slightly but then will stop because of the frozen oil and the damper. So then at that point we - we have to supply enough force to break a bracket which holds this damper actuator. That's a relatively thin bracket, it doesn't take much force to break it. The original intent on the standup EVA, as you remember, was to grab the beam at the bottom and to pull up on it. That would do the same thing - the force required at the end of the beam would be about 19 pounds to break this bracket. Now because of the - of the particular geometry that we're using, we have to supply more force now. We don't have the same moment arm to apply that force with. So that we've gone to this beam erection tether which I mentioned. Now that's the same thing as if you've just took a piece of strap and hooked it to the floor over there and hooked it to the floor there - take all the slack out of it and grab it and lift on it. And you, of course, put a lot of tension in that strap and you put a heck of a lot of force in the two attach points on the floor, also. That's exactly what we're doing here, we have this tether hooked to the A-frame up on top and it's hooked to the vent module down here. Pete stands up just above the hinge, and as he stands up with it, it puts a force then on that hinge moment - around the hinge and will break that bracket and the beam will then start to come up. From that point on it's simply a matter of

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cleaning up the mess and getting back in. We intend to bring essentially everything back in with us, although we have decided to go ahead and leave the BET attached. There's no particular reason for that because the damper actuator which raises the beam, or normally raises the beam, is not in any way related to the latching mechanism. It's separate and we expect it to latch in a completely normal way, but rather than scramble back down to the beam and disconnect the hooks, we've decided just to leave it hooked up out there, and we just cinch it down. I think that before we have Q & A, I'd just as soon go ahead and show that - where does everybody look to see that thing? Oh, up there, I guess. If we can go ahead and run that 12 minute clip, and I'll just go ahead and narrate it and you'll see what all of that looks like under water. That's EV 1 in the foot restraints just outside the hatch. You see the open hatch there on the left. And the first item that's going to come out is the BET, that's the big apex hook which will be hooked to the A-frame, and you see the PBI rope, which forms the BET itself, coiled up behind it. We also happen to have the pry bar taped to the bit, just as a convenient way of carrying it out, so we don't have this thing dangling around on us. The next thing that will come out will be the first rod, with the mushroom - this is a poor model - but a mushroom cap on the end of the first rod, and that's just to give you something nice and smooth that you can push on - if you're pushing on the rod when you're pulling on the rope.

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SCHWEICKART - put a mushroom cap on the end of the first rod and that's just to give you something nice and smooth to push on if you're pushing on the rod when you're pulling on the rope. These are the same rods that we put onboard to use during the standup EVA and were used by Paul Weitz all ready during that standup EVA. I have a sneaky feeling that what we're looking at is the 37 minute clip instead of the 12 minute clip. Do we have anyone responsible for this television here? There is the first rod coming out, in fact, I know it is, John. I'm glad we don't have the audio on. (Laughter). Well, the rods - we have a whole bunch of rods all of which are identical - three of them were stowed onboard to be used during the standup EVA to try and raise the beam. There are another 24 rods onboard which are an integral part of the two-pole sail. They all are as I say identical and they mate together. Now we have for that two-pole sail rig two spare rods - that is we really only use 22 of them. And so we have the two spares that we're using on this rig. However, we expect to bring all of them back in so we don't anticipate losing anything, any capability to put out that tow-pole sail. What's the word, John? Okay. Well, why don't we talk about other things and when they get it why don't they give us a cue and we'll go back to it. Why don't we go into Q&A then. Okay.

PAO We're going to take questions now, if we are why don't we - Raise your hand - Wait for the mikes. Oh, okay. Well, I kept saying hands.

SCHWEICKART All right, I'll go through the tools first then. The cutter is, of course, on one end of the rod and we have to modify it to the extent that it was designed - the rope on it was designed for three rods and we will be using 5 so we had to add 24 feet of the PBI rope to it. That was one of the things the crew did this morning or last night. At the other end of those five rods we've got this mushroom fitting which goes on to give you a nice smooth end to push against. On the beam erection tether I have nothing here that I can show you except the photograph of what that looks like and again it's from the end of the apex hook. And this device was stowed onboard to deploy the - what we call the JSC sail or the SEVA sail. That's the one where you flew around the vehicle and hooked it into the bottom of the thing and flew up to the ATM and hooked it on. This was what we call the apex hook, the one that hooked on to the ATM handrail. It will not be used for that now and we've taken advantage of the design of it to use it for this tether. On to that the crew has tied a 32 foot section of PBI, which in turn is hooked to another 6 foot piece of PBI with small Apollo hooks

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on either end. In other words, we have this long tether that comes down and at the end it forms a bridle to go out to the two lower corners of that number 1 vent module. SO Y is right at the bottom. When we go out, taped onto that simply as a convenient way to carry it out, we simply tape this to the PBI down near the vent module end. So that's just to carry the pry bar out and as I say these are all ready on the onboard tool kit. We'll also be carrying out the bone saw and the bone saw comes in this little package. In fact, in my back pocket here I've got the one that we've been using over the past week or so. This one has now cut through 11 sections of this strap and it's still going strong. We've cut through three times under water with it and 8 times in air, in front of people of all kinds. (Laughter). If anyone has any aluminum I'd be glad to demonstrate it. I was thinking mainly of position. This is, by the way, a piece of the strap that we anticipate holding down this beam - that is the cross section of which is what we expect to see when we get out there. And this was one, in fact, which we cut the other day - In fact, the one that you'll see being cut on this 12-minute clip. On one end of this it was cut with a bone saw, and then after we cut through with the bone saw, in order to verify the cutters, we put the cutters down below that one and cut the other end off with the cutters. So this is the section that ended up coming out of that under water mockup. We also carry out vice grips. These vice grips, again, come right out of the onboard tool kit. We have no specific use for these. They're just a generally handy thing to have out there. Since they are adjustable we can adjust them to hook on to just about any - -

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SCHWEICKART They're just a generally handy thing to have out there. Since they are adjustable, we can adjust them to hook on to just about any kind of an edge or a piece of metal. And even if you don't want to do any work with them, they form - they make a pretty good handhold, if nothing else. So we felt that this was just ah - since it was onboard it was a good thing to carry out. And that will be clipped right on the top of the pressure control unit, the PCU, on the commander's chest, on EV-1's pack there. As I say, it will not normally be used. We've got the 2-prong hook here, I guess I should mention that. In order to make sure that when we grip the- when we're forming the hand rail out of this thing, in order to make sure that it holds on to the strap, we keep tension on this rope, which then ensures that the jaws stay clamped on. Well rather than stand there and try to hold that, what we've done is we've - here I tried to take it apart before, but didn't have enough tools. We took just the end of it off here, the operating end, and the adpter is gone, and we then we taped this, we actually use a hose clamp, and hook it to the end of the - let me put it on here, to the end of the rods just above the mushroom. We just use a hose clamp and put it on there and that way we can cinch the rod around it the same way we would with a sail boat. So that when you pull tension you then take it up and that way Joe can let go of it and the thing stays hooked on. The shepherd's hook here is also going to be placed in the - in the lock compartment and it will stay there. We don't anticipate using this either. However, it's such a handy little tool, that we really decided it was probably the best thing to put in a place where we could get at it EVA, just in case, for whatever reason the cutters did not work, as far as using something to grab. So we have worked out a means by which we can hook onto the beam, using the shepherd hook here. But we consider it running a poor second. But it will be in the locker compartment and available for use. Let me think what else we've got in the way of things we take out. I think that's just about the full contingent, except for, just a devil of a lot of tethers, wrist tethers, waist tethers, things of that kind, which are used to hold either the equipment or yourself in place. Hark, coming over yon hill, is a 12-minute film clip, an optimistic outlook, okay.

QUERY Before you do that could you kind of show what the configuration (garble) relationship to the (garble)

SCHWEICKART Well, we think that the beam, of course, you'd have to take off the solar panels here, but the beam itself, we think is down on the side of the vehicle, and is deployed at an angle of about 5 degrees up from the side of the

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vehicle. I think we can go into that in more detail. Okay. Let's roll it. Maybe I can stand over here by the monitor and use the pointer. You're supposed to watch that (laughter). I can go over there, good. My friend said I could come over here. They really are ready, Don. Okay. This one was, as I say, is only 12 minutes long and is chopped up in short sections (laughter). Okay, here you see the five rods are already assembled and we just put on the cutter tool on the end. I want to point out that you're going to see a lot of extra stuff on here. That's all flotation gear for neutralizing this equipment in the water. All of this is foam which is put on so that the things don't rise or sink.

QUERY Are those the abrasion gloves you've got on there?

SCHWEICKART Yes. These are the abrasion gloves. And you can see the wrist tether there. I've got another wrist tether on this wrist.

QUERY Will those cutters be protected to protect the skin?

SCHWEICKART Yes. We use tape around the, all the threads and bolt heads. Okay. Here comes EV-2 out. This is Ed Gibson. Ed has been doing most of this EVA development work with me over in Huntsville in the water tank, there. And he heads up in what's not a normal direction to go when we're going EVA on Skylab. But in a pinch we're flexible. He's got 35 feet of umbilical, which is going to be trailing out behind him. And he has to unstow that before he heads out and there's the A-frame, by the way. And this is the tray that the discone antenna lies in before it gets deployed. I don't have that on the model.

QUERY That is Kerwin, right?

SCHWEICKART That will be Joe Kerwin, that's right. Okay. Then after he gets up there in place, he's tethered himself at the foot of the discone antenna, and he's sitting up on the A-frame, and I have a straight shot now, passing the tool right up through the truss work to EV-2. And now one of the other jobs of EV-1, that Pete will be doing here, is he's now unfurled this line and he's stringing it out as he's passing up the cutters. So that when it comes up past EV-2, it's all ready strung out all along the rod and cinched at the end. And as you can see, that comes right up underneath the trusses. There is the discone antenna in the background, it's sticking up off the side of the vehicle. You notice Ed very cleverly stuck his fingers right in the open jaw. (Laughter)

QUERY What kind of gloves does he have on?

SCHWEICKART The normal extra vehicular gloves.

QUERY Why doesn't he wear the (garble)

SCHWEICKART We only have one set on board and besides that there's no - there's no sharp mater - -

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SCHWEIKART - extravehicular gloves.

SPEAKER We only have one set on board, and besides that there's no sharp materials that he'll be handling at all. Everything in this area is all well known.

QUERY So Conrad will wear the (garble)

SPEAKER That's correct.

QUERY Does it make it easier to work with things? (Garble)

SPEAKER Are you kidding? No, it doesn't make it easier. Okay, now here you're beginning to see some of the problems of the water whenever you're moving anything through the water. It's got a lot of drag and you alway have buoyancy problems because it's extremely difficult to neutralize things exactly. What you're going to see down here, starting here, is a section of the beam. We don't have the whole beam under water, we've just got a section which is located around the debris. Okay, now, here you begin to see some of these problems. This is just a very short shot here. But if you can see it a little better, Joe has a tether going from his chest down to the foot of the discone antenna. And here is the pole laying out down the side of the beam and here's the strap coming down over the beam and hooked to the meteoroid shield on the underside. Okay, at this point now, he's positioning it in such a way that the cutters are laying up against the beam and he's trying to locate the strap to get the open jaws over that strap. Now, once that's done, it then gets tethered down on this end, and we have as you can see a handrail and no - you don't have to hold onto it on either end. EV-1 will head down with his feet down in this direction. This discone antenna, by the way, keeps going for a long way, but in the water tank we just have a stub in there. As he goes down now he's paying out the BET. The BET is hooked up here on the A-frame and he's paying it out, hooked his wrist as he goes down. And also EV-2 here is trying to guide his umbilical to keep it from snagging on anything.

QUERY How long will EV-1's umbilical be?

SPEAKER Fifty-one feet. It's 60 feet long, so you've got nine spare. Okay now you're down on the other end and here - this is the beam - here's the strap which is coming down over the beam and EV-1's left hand, then was holding the cutting tool. Now, what he's doing with his right hand is what's important here, and it's about to show that. That is hooking these hooks into the corner of the vent - the corners of the vent module. And you'll see a better picture of that in this next clip. They're just a couple of little cutouts in the corners of this vent module, into which these hooks fit. Once they're in there then the slack is taken out by

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EV-2 so that they stay in thare. Now, what I've done here is I've opened up the cutters and I'm repositioning them to what we would hope to be a weak point on the strap. As you probably didn't grap from 25 feet away exactly where you would like to grab, and so what we're doing is just demonstrating that we can position them very accurately, very carefully under water. And then of course he takes down on it again and you can see the jaws closing there. And at that point - well EV-1 readjusts his tether or hooks it up, up here. Now, we go out of sequence here a little bit. Normally, in flight tomorrow we expect Joe to just go ahead and cut right there, but we're doing the prying first. And we're doing that because we can't - we want to have an intact strap to do the prying and also the bone saw to demonstrate that we can do that. So, that was using the pry-bar and the next thing that we'll do is get out the bone saw, which is under the left wrist - under the left abrasion glove. Okay, here you see the bone saw hooked onto the wrist tether. You slip it under the strap, and we know that there is a gap underneath it - a gap between the strap and the beam, and those rings just very nicely fit over the thumbs in the glove, and a moment later you're sawing away. And it took me 45 seconds to get through that strap that day. So, after a Eureka or two, there it goes. Okay, then we grab the cutters just below that cut and pull on them. Now, you realize this is a worse case because the piece of aluminum is now pulled over in the direction that you're pulling from, so it makes it harder. But it's that little piece we cut off that's laying on the table there. Okay, now here we are under the BET. Unfortunately it's a very quick shot and here you see the strap going up and you're just lifting up on it and it goes back down the other way to the A-frame up on the top - well they cut off the shot there unfortunately. I think we can probably just cut it off there, John. The rest of it is simply getting back in. Now, in tomorrow's sequence, we will be doing other tasks EVA which we consider low priority in comparison with this, but we do have other things planned. The other tasks? Yeah. We have - the normal EVA path of course comes out to the Sun end of the ATM. There goes that discone. We have a couple of problems which we'd like to take care of which will make operations easier. One of them is that the S054 aperture door - these bumps here on the end are all the aperture doors on the telescopes, and the S054 door, as most of you know, was showing some signs of being very bulky, and as a result, we're leaving that door open now. The doors are interrelated in such a way that when we leave the S054door open we also, of necessity, have to leave the S052 door open, the white light coronograph. And that makes a very difficult operation and as a result

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we're having to open and close all the doors manually now. We'd like to get back into a normal sequence. We design that capability in, but unfortunately it requires an EVA. And what we do is we back out a locking pin between the door and the pivot that turns the door. And when we back out that locking pin we've essentially disconnected the door itself from the driving motor underneath. Once we've disconnect the door - -

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SCHWEICKART - it turns the door and when we back out that locking pin, we've essentially disconnected the door itself from the driving motor underneath. Once we disconnect the door from the motor, we then throw the door all the way open and we latch it with a little hook on the outside. So what - then we can go back into a normal operation on the doors - auto sequence the rest of the doors and the S054 door will just be disconnected from the motor, so the motor may or may not drive back and forth, but the door is always going to stay open. That's one task. That's a very simple thing to do.

QUERY Ar. you giving these in the order they are to be done, most likely?

SCHWEICKART No, there's no real order to them. There are really three or four different things we're looking at, but it's really up to the crew. The procedures are up there, but I'm not sure what order they'll do them. Another one is to take out the S082A film magazine. It is giving some indication that it really isn't taking any film. We don't know that for sure. We don't have any indications that it is, in fact properly exposing film, and so as long you know. It's sort of a while you're up get me a Grant's kind of thing, while you're out, change my film, and so we are going to take out the S082A film magazine, a replacement magazine, and while we're out there we will remove the exposed film, we think exposed, but we don't know and replace it with a new film magazine. That is , essentially, a normal EVA task. Normally on Skylab 2, we don't replace film, we only bring - retrieve the film, but that's a very minor modification to a procedure we've trained on for a long while. The third task will be for the Commander to eyeball the QUAD-A up here on the CSM. QUAD-A is running slightly higher temperature than we expected it to, and we'd like the Commander to look at it just to see if there's any unusual discoloration around it, or anything which help us in evaluating why that QUAD is running a little high. Those are about the tasks that we're talking, I guess.

PAO Okay, I guess we're ready to start questions. Rusty it's your option, if you want to continue to stand, or slip up here.

SCHWEICKART No, I'll stand.

QUERY Aren't you going to get the TV too?

SCHWEICKART Oh, I'm sorry, yeah, I beg your pardon, yeah. We're taking out the TV camera also, and this model just doesn't hack it. Now, you want to realize what I'm doing here. I'm tilting this thing and I shouldn't be, but

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I'm doing so in order to show you this - what we call a double handrail. Let me turn it just a little bit. This is what we call a double handrail and it's a handrail which enables us to get down to the Sun end of the canister, when we're EVA. What we'll do is to send out the TV camera on the film transfer boom to that double handrail, hook it on there and look down along the front of the vehicle here to enable us to get a look at the parasol, to see what the discoloration, if any has occurred and the geometry of the parasol is. Also, of course, we expect to put it over in this direction, so that we can see the SAS wing and see what they look like. That's something I ought to mention by the way, in fact it gets a little bit critical. When the damper actuator on top of the hinge of the beam here - is at minus 60 degrees, and we know it's frozen, or we have high confidence that it's frozen. On the other hand, each of these panels, which are independent - they deploy independently - has a damper actuator at the top also, and these are at minus 40. It is expected now, that when the beam raises, the panels will begin to deploy slowly, because it's considerably below the normal temperature for the deployment, but we expect that within lo minutes they will fully deploy. It turns out that if they do not deploy, if our temperature readings are wrong, or the oil freezes at the different temperature, or for whatever reason, they don't deploy, that means we want to get heat to those actuators as fast as possible. The reason for that is that once the beam comes up, it looses the heat radiated from the workshop. It's been up against the workshop and we are getting heat from the workshop. Once we raise that beam, those damper actuators will begin to cool off at a fairly rapid rate, about 7 degrees an hour or so. If we take too much time, they'll very definitely freeze rather hard, and then when we go to heat them up, it will take a considerably longer time. So what we'd like to do is maneuver - if the panels don't come down - we plan to maneuver within an hour after the beam comes up, in order to get heat on the top of the array here on top of the beam, to try and get those dampers thawed out so the panels will come down. And as I say, we expect the panels to come down. We've passed that up to the crew, but we do have that maneuver standing by so you may hear about this 45 degree pitch maneuver that we've got to preform in case the panels don't deploy.

PAO If we're ready for questions, let's get some on the transcript, John. You ready?

QUERY If the panels don't deploy is there any backup plan to go up and try to drag them out?

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SCHWEICKART No, Skip, we don't have any - we have no way of getting down to pull the solar panels out. We can bring the beam up, but there's really no way that we've looked at, and there doesn't appear to be any easy way to manually help them out.

PAO Arthur Hill.

QUERY One thing bothers me is the part where the crewman stands up with the beam erection tether. I don't quite understand what he pushes against or uses to put the pressure on to pull out the beam. I'm just not clear where he's standing and what he's got - where his foot hold is on all that.

SCHWEICKART Arthur, I'm tempted to string out this microphone cord and demostrate it here in the room for you, but if you picture a rope tied to this end of the table, and one tied to this end of the table, with no slack in it, or very little slack and somebody stands up in the middle of it who's, you know, three feet high, you can see that as he stands up he's going to get a lot of pressure trying to holding him down, from that rope. Therefore the pressure to stand up, the thing which will enable him to stand up, it's like standing on --

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SCHWEICKART - - that rope, okay. Now, therefore the pressure to stand up, the thing which will enable them to stand up is that it's like standing on top of a bow and arrow, I mean of a bow, where you've got the bow string there over your shoulder and you're standing on the front part of the bow. And when you stand up, you're putting a lot of pressure on yourself. And at the same time, as you increase that pressure, you're pulling those two attached points with a considerable amount of force. You're pulling them together. Now that same - Now when you've got a hinge in the middle of this table you're going to fold up that hinge. And that's exactly what we're doing.

QUERY Rusty, if I understand it right, he's tethered to the pole, in fact when he goes down, which after cutting can't be used as a handrest any more. If he tethered - When he - does he stand up, is he tethered to the BET?

SCHWEICKART Ye. Angus, right after we cut the - in fact before we cut the strap, in fact right after we take the slack out of the BET, when we first hook up the BET and then take the slack out so that it remains in place, we then transfer the tether, that waist tether that's located on the left wrist, you have to be careful, you've got waist tethers on wrist, and the wrist tethers on heads and all, (laughter). We take that left - the tether that's on the left wrist and transfer it from the cutting tool here onto the BET. From that time on that's the tether point.

PAO Bob Nicholson.

QUERY What happens to this mission if all of these plans don't work?

SCHWEICKART Well, I'm not the guy to ask about that. I worry about how to make it work, there's somebody else who worries if it doesn't.

QUERY And if they should work and they complete all of their works within the next day or 2, what does NASA hope to accomplish from here until the 28-day period is out?

SCHWEICKART Well, if we get this SAS wing up, we go back to, essentially, a preplanned mission. We have full capability then to perform all of the -to supply enough power to perform all the experiments and all of the rest of it. Now, exactly, since they have missed some experiments up to this point, exactly which ones get scheduled and which ones don't are a matter of the priorities that have to be worked out. But as far as our capability is concerned, even though we only have one of the two wing, we're essentially back to a normal full capability. Each one of these wings, one on either side, supplies all eight electrical - all eight batteries that make up the power system in the airlock module. So having any one of them will enable us to fully charge the batteries and fully power the system.

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PAO Nick Chris.

QUERY Could you give us a few more words on these space acrobatics, for example you said a while ago, that Pete Conrad is going hand over hand belly down. How far along - how far will he do that? How much distance is involved - -

SCHWEICKART 25 feet.

QUERY 25 feet, and then earlier today you were talking to Conrad, and you mentioned about something of curling your toes around the beam or something like that, what did you mean by that exactly?

SCHWEICKART Okay. That was for Joe Kerwin. When we - Let me take my little model here. When we've got this cutter tool laying down on the side of the beam, the question is how to pull on that rope. And if you're standing perpendicular here - If I'm standing here and it's like this, and I go to pull on this rope, it ends up pulling me over. And I'm pulling against this thing, and I head toward it. That makes it very difficult to apply very much force here. Well the easy way to do it - let me just have the cutters laying along here 25 feet down along - and let's say this is the skin of the workshop, well we've found that the easy way to pull on this rope - first of all you don't need to, you don't need to push against the pole and pull the rope. You can simply pull the rope,and just let the pole come back a little bit with you. It's hooked onto the strap, so it's not going to go anywhere. Plus the commander has got his hand on it up here (garble). So all that Joe Kerwin's got to do, is pull on the rope. Now the best way to pull on the rope is to lay down, face down on this surface just like this, take your toes and hang them over the edge, and pull on the rope. And that makes a very nice little haul. You then are pulling against your own toes.

QUERY Then his toes are - -

SCHEWICKART They're just laying over the edge, just directly over the edge of the workshop, right over this edge. And it's just like hanging from your toes, you know, on a trapeze when you were a kid or something. And all you're doing is pulling on the rope. But what it means is, you don't have to worry about stabilization, because you're in the right orientation.

PAO John Wellford.

QUFRY Could you tell us how the rehearsal went today? Do you feel that the astronauts understand all that's required of them? Are there any outstanding questions at this point?

SCHWEICKART No. We've passed up just a tremendous amount of information over the last couple of days. And you

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realize of course that what - what we had to do here was to take relatively subtle techniques that you work out, you know that you normally practice before flight and you have all sorts of time to try yourself and all that. And you're trying to pass that knowledge up in - in purely verbal form. We could see their pictures but they can't see ours and that - that's a rather tremendous challenge. Now, we did some of that on the teleprinter in writing but then there is a lot of it that we felt that just had to be direct voice contact and it didn't lend itself to - to writing out directly, but last night in the EVA briefing they had already begun to assemble some of the gear. And when we came over the hill this morning and picked them up at Goldstone they had - they had essentially had it all put together so that was a very pleasant surprise and - and from everything we saw on - on the TV - well if you weren't extremely familiar with it you could lay it side by side with the equipment we've been using at Huntsville and looks just like it - they - they did it exactly the way we tried to tell them to do it. It was pleasantly surprising. In fact Pete did some innovation on it and he ended it stowing this tether - or the BET rather on this one - the BET in a bag they had on board which will make that much easier to deploy that what we have been doing.

PAO Bruce Hicks

QUERY I had several, Rusty, first of all couple that you've bro - -

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SPEAKER In fact, Pete did some innovation on it and he ended up stowing this tether - or the BET rather, not this one but the BET in a bag they had on board which will make that much easier to deploy than what we've been doing.

PAO Bruce Hicks.

QUERY I've got several, Rusty. First of all, a couple that you've brought up. You're talking about hanging your toes into the edge of the workshop. What was the V-position that Ed Gibson was talking about?

SCHWEICKART You try to say - get your body like this, because what happens then is when you pull on that rope it forces your helmet down against the workshop and you've still got room under your body to pull the rope with.

QUERY And back to one of Art's questions. He was talking about what you are using to - where are you putting your feet to get the pressure on the BET. Your feet are indeed on the side of the workshop, is that correct?

SCHWEICKART Nope, they're on this fairing - right above the hinge point on the fairing.

QUERY . . .

SCHWEICKART No, it's parallel - Arthur it's this fairing right here, if you'll look at it it's parallel with the workshop surface. It's - this piece isn't there. That's (garble)

QUERY The vent modules that the bridle is going to be hooked into - how strong are those? Are they going to be able to withstand because weren't those vent modules supposed to have something - part of them partially ripped away and - -

SCHWEICKART No, that was a misunderstanding on our part. They look and have functioned exactly as they were designed to. We took an actual vent module over in Huntsville and applied this kind of force to it with no problem at all. In fact, we then manufactured another one which we might run to destruction. We manufactured one with the same material and everything else and in a counter-balance beam we broke many of these brackets that I'm talking about the actuator damper being hooked into. We've broken on the order of 10 of them now I think. And we've done that on a counter-balance beam over there and using all of the normal equipment. And then what we did was, we held the end of the beam down, purposely, and we put over double the load which we expect to break lose the beam into the system and then inspected everything for any damage and there's no - there's hardly a dent in it. So, we know it will take over twice what we expect to put into it.

PAO Jerry Bishop.

QUERY On the pry bar. Won't Conrad have to be

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hooked to something or braced against something when he pulls up on the bar or pushes down on it , whichever way he's going to do it?

SCHWEICKART When you use the pry bar you put it underneath the strap and then pry up on it. Now, that forces you down onto the top surface of the beams, so the actual prying action tends to hold you right exactly where you want to be.

PAO Jim Maloney.

QUERY They've seemed to have done all the right things so far, yet Pete said it's going to be difficult and Kerwin says there's a 50-50 chance and you're confident. Is that because you've - -

SCHWEICKART That's an excellent summary Jim.

(Laughter)

QUERY Well, is that because you've practiced it and they haven't or what's the difference?

SCHWEICKART Yeah, we've done it and we've seen what it's like and they haven't ever seen it before. They're - they have a mental image of what it is that we're asking them to do and what we're talking about and as a result I think they're naturally more conservative. But I think that that's a very healthy attitude with which to go out and attempt this thing.

PAO John Pollock.

QUERY I have three, Rusty that are - the first one is a follow-up to that. Can you kind of assess subjectively from your own experiences, EVA and in the water tank? What differences do you expect and how much easier or more difficult do you think the crew will find it than you did?

SCHWEICKART Well, first let me say that this is not going to be an easy EVA. I don't think that anyone would ever say that. We're going into an area where we have not set up normal handholds and foot restraints and that kind of thing and the utility of those devices was emphasized to us very strongly when we first attempted this over in the water tank at Huntsville. It was a terrifically exhausting exercise when we first started out and we didn't have our concepts down and we were in the development phase. Now, in contrast to that, by the time we ran a third time on Sunday using the techniques which we'll be using tomorrow, the task was considerably simpler and we were able to do it with relative ease. Now part of that is because we had done it three times in the development process, so there's obviously some learning involved which a crew is not privy to. On the other hand, we think that a lot of the difference between when we started and when we finished up on Sunday was due to the fact that we had developed equipment and ironed things out to the point

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where the equipment that we're using in the techniques made it that much easier. Now the other plus, as far as the crew is concerned is that they're really used to working in zero gravity now in a way which nobody - no human beings have ever been before, so that I think that that's going to be a very definite plus. But there is no question that it's a much more difficult EVA and you may have - than on normal EVA's and you may have noticed that I reminded them a couple of times of Richard Gordon, who learned - all of us learned through Dick, the hard way, about proper restraints and tethers.

QUERY Okay, the clearance between that strap and the beam fairing - what kind of clearance do you think they have and is that enough so that you get a clean cut with the bone cutter?

SCHWEICKART Yes, on a voice relay call the other day from - we were over in Huntsville doing this work and we got relayed up to the crew, and they described the - first of all, in the standup EVA they were able to get the prong - so this two-prong tool under the end of the strap on the top of the beam, and they said they could get it under about a fifth to a quarter of the way up these prongs. So, if you look at that that means that there is about a 1/4 to 1/2 inch spacing between the top surface of the beam and the strap up on top. We then asked them about the spacing on the side of the beam and they reported that the strap bows out 2 to 3 inches as it comes around the side of the beam. Now, as you can see from these cutters, you can get a grip on something if it's - -

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SCHWEICKART - about two to three inches as it comes around the beam. Now, as you can see from these cutters, you can get a grip on something, if it's no more than about 1 inch, 3/4 of an inch, standing off from a flat surface. So we don't anticipate, from what they reported, a problem in getting the cutters over the strap.

PAO Neil Ross up here.

QUERY In the film clip, using the pry bar, your glove came awfully close to the angle. How sharp is that piece of aluminum expected to be, and how much - is there a danger that - (laughter). Is there much of a danger then that you could cut your glove on that? Is the glove strong enough to withstand that?

SCHWEICKART The answer is yes, and yes. It is sharp, or at least we expect it to be sharp, after all, we've talked about metal which has been ripped away. On the other hand, we did exactly the same thing to the - I've got the - I've got photographs you can look at afterward here. We did the same thing for the simulator over in Huntsville, Alabama, where we actually took this same metal and ripped off the meteoroid shield, and then the boys in the shop had a heck of a good time bashing it up with hammers and chisels and everything they could. So that we had a worse, what we feel is a worse case situation there under water. We wore the same gloves all the way through the whole exercise in developing this procedure, and we handled that strap a tremendous amount. We have not in anyway damaged or cut through those abrasion gloves. So we don't feel that there's too much concern there, Now on the other hand, we do anticipate some motion of the strap after it's cut. And it's not just holding on to it that's going to bother you, but if you're holding it when it moves, with some energy, then there's a possibility of ripping the outer layers of the glove. And to cut all the way through the glove is just about impossible. To really hurt the glove seriously is almost an impossibility. But, nevertheless we have precautioned the crew on several occasions that when they use - especially the one you pointed out, the pry bar, it's very natural to grab a hold of the thing and pry, just like that, and you have to position the pry bar and hold your hand back here and pry. So we have mentioned that several times, and we intend to mention it tomorrow.

QUERY Do you expect from the pictures or engineering analysis that there any other sharp pieces of aluminum along the trail.

SCHWEICKART Not along where we're going. Now, up underneath the beam, we do expect to have an edge to a ripped piece of meteoroid shield all the way down the length of the beam.

PAO Okay, let's take about three more questions. We're going to have to get Rusty out of here some time. Reg Turnel.

QUERY Just a couple. I've never understood what this strap was before it became this strap holding the beam.

SCHWEICKART The strap that - of which this is a piece - I guess the best way to show it, is to say that this raised surface here is a micrometeoroid shield. It goes from this point up to here. This particular angle is a longitudinal seam, which started out three inches - looking at it from your direction - where'd my beam go - here it is. If I could take these off and hold this up against the edge - which started out three inches to the right here, of where the beam is up against the side of the vehicle, and it looks as though the meteoroid shield peeled off from over on this side on the top and ripped down this way. And in so doing it pulled that - this angle up against the beam. It also, well, at first it ripped off. Now, we see that angle in the enhanced TV photographs, we see that angle running down the side. It runs down the side of the beam until you get to this vent module, and right about halfway down the vent module the angle comes up and over the top, barely, and is missing from here on down. So we think that the angle from here down is just gone away with the meteoroid shield. Therefore leaving just the meteoroid shield material, which is only 025 aluminum underneath the beam. Whereas up here we have the stuff under the beam, and the angle, and the meteoroid shield ripped to the right side of that angle, down to this point, and then it switched. Now, we expect, also, that a piece of this angle - there's a flange missing on one of these pieces of metal - and it looks from the photo interpretation as though when this angle starts up around the beam it's split, and part of it goes straight down for about a foot or a little less, and the rest of it comes up over the top. And we think that it's the softer aluminum, which bent up over the top, and the tougher aluminum, the 7075 aluminum, fractured and went straight down. So we actually expect to find an easier job than we had planned for, as far as the cutting operations are concerned.

QUERY And my other question was: When Conrad stands up with the rope over his shoulders, if that hook should fly out of the beam, what's going to be the effect on Conrad?

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SCHWEICKART Which hook, now?
QUERY Into the beam, into the vent.
SCHWEICKART Okay, we've taken a couple of precautions on that. The bridle is attached to the other rope. I don't have ends of rope here, but it's attached to the main length of PBI rope that makes up the BET, with a bowline that has a very small loop through it, so that the hooks themselves cannot get through that hole. As a second precaution, we tied, and you may have seen that on television today, we tied --

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SCHWEICKART - through it. So that the hooks themselves cannot get through that hole. As a second precaution we tied - and you may have seen that on television today - We tied a knot here on either side of that attached point, so we have the freedom to equalize a load down there in the bridle but at the same time if one side gives way, it'll go up against that knot, and then stop. So that there will be a slight relaxation in the tension, but nothing more than that should happen.

PAO Okay, let's take Don Wiseman, Jim Maloney, then close it.

QUERY With that damper broken hopefully, how fast do you expect that beam to come up?

SCHWEICKART .82 feet per second at the tip. That'll take - Don - just to finish that one out. That'll take about a minute to go from the fractured position to the full up and lock position. It'll move - it'll seem as though it isn't moving. Excuse me, Jim.

QUERY What about the possibility that some or maybe all of those little glass photocells have been damaged with all this ripping about?

SCHWEICKART Yeah, are you asking me are they Jim, or are you - -

QUERY The possibility that with all this ripping about that you were talking about took place that they were damaged?

SCHWEICKART Let me give you a picture of the time sequence here. These cells all accordion up inside the beam so that it's only the last section of the accordion below that lower white line which is actually - if you look at the under side of the beam before they were deployed that's all you'd see - just that last section on each panel. Okay? Now, let me point out that this beam, when we launched the vehicle is cinched down directly on top the meteoroid shield and that when we lost the meteoroid shield this beam was fully down, that is, it was not partly up at that time. It was fully down, tight against the meteoroid shield. So that when the meteoroid shield ripped off it was - in some ways like taking a ruler on a piece of paper and ripping it off. That aluminum is only .025. It's very thin stuff and so this beam was holding it down and the aerodynamics just ripped the meteoroid shield down the edge. Now, you don't do much damage to the bottom of the ruler when you do that. And in somewhat the same way we don't expect to see a lot of damage there. Now, subsequent to that Jim, we blew the tiedowns on the beam to deploy the beam. And the beam came out 5 degrees and then stopped. So our picture here is at that strap initially

SKYLAB NEWS CENTER
Houston, Texas

Medical Experiments Status Briefing
Johnson Space Center
June 6, 1973
11:00 a.m. CDT

Participants:

Dr. Royce Hawkins, Medical Director, Life Sciences
Dr. Robert Johnson, Principal Investigator on M092
Edward L. Michel, Principal Investigator on M171
Dr. John A. Rummel, Co-investigator on M171

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PAO Fine, yeah that's reasonable because - because the one - the one thing that we want to watch a little is the time because we want to certainly be in a position once we start getting a lot of Air-to-Ground to switch back to simulation as such.

PAO Okay, we're ready to get started with the medical experiments status briefing and I'll open with Dr. Royce Hawkins who'll have a summary and then introduce the other three gentlemen with us today who have experiments.

HAWKINS Fine. Thanks John. We - this is really kind of the meeting we started to have yesterday and (laughter) we are about 24 hours late. Let me briefly introduce the panel members that we have here with us this morning. On my right Dr. Robert Johnson, who is the principal investigator on M070 - M092 experiment. That's the lower body negative pressure. On his right, Mr. Ed Michel who is principal investigator for the M171. And, on his right, the co-investigator for that M171, is Dr. John Rummel. Now, let me briefly touch on some of the - the other experimental areas of which we really don't want to dwell on too much this morning. I brought these gentlemen along so that we can - we can really concentrate upon these two particular experiments and - and give you a little more depth as to how these experiments have gone thus far, and what they as principal investigators think about it. With regards to the - the M070 series - the food nutrition balance studies, I think that that is going very well. The crew - crewmen are eating very well. They're water intakes are now at a - a sufficient level so that we feel - in urinary outputs are sufficent level that we feel that we have good balance. In the earlier part of the mission the water intakes were pretty high and the urinary outputs were a little bit low and here again I think the - the heat of the environment that they were working in - the other stress factors - I think account for that. Things are stabilized at this point, I believe. The - the - the M131 experiment are - What's that, John?

PAO It's an Air-to-Ground.

PAO It sound like they got a - okay.

HAWKINS Okay, the - the M131 experiment is - too is going well. The - let's see, I believe - how many runs have we had with that - I believe 2 runs -

SPEAKER Yeah, what ever number that is -

HAWKINS On M131, - how many runs have we had?

SPEAKER I think it's about three.

HAWKINS Three. But anyway the - so far the - the crewman are going through the - the - the head movements and completing the entire hundred and fifty head movements, and thus far have experienced no motion sickness problems. Now the entire analysis of that data in the other parts of the data which that experiment is producing have not been completely analyzed now. We'll bring this one to you at a - at a later time to where we can dwell on it in some depth. The sleep studies here again I

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think are going very well. We h had some difficulity with the sensors, - those - the - those were located in a particular hot spot area of the spacecraft ... he beginning. There's been some drying out of these. This electr... paste in those sensors and we did lose the first night's run with the Science Pilot. We - we do have sensors located in a cooler spot which are - which are intact they're - they have been working satisfactorily. We have now arrived at a point were I think we're getting almost complete night coverage of the sleep - whereas in the beginning we were doing about 50 percent, and the Pilot has, or Science Pilot, who is the subject for that, has complained somewhat of some - not so much discomfort but something of an - of an awareness that the things are there and he tends to wake up a little more frequently through the sleep period than - than he - than he does when he's not wearing it. Now for this reason we've decided we will not run that experiment tonight because we would like to insure he has a good night's rest prior to the EVA activity tomorrow. And we just - want - just delete it and won't take a chance on - on it disrupting any sleep. Okay, I think that pretty well summarizes most of the others except the blood drawing, the M110 series that we did have the third blood draw this morning on all three crewmen and that - that went very well. We've had - had no problems today with that. Okay, now I'd like to turn it over to Dr. Johnson, for the M092.

JOHNSON The M092 experiment uses lower body negative pressure to stress the heart in a manner similar to what gravity does on Earth when a person stands upright and quitely. The first M092 run was performed on the Pilot on the 28th of May when we still had a hot workshop. The temperature was 94 degrees at that time. The humidity however, was quite low, so that they apparently felt less subjective discomfort from the heat. We felt as experimenters a little apprehension about doing this experiment at those temperatures. You want to - -

SPEAKER No.

JOHNSON - - go on?

PAO No, I would continue that's - I believe something from the water emersion facility at Marshall. It - it's over.

JOHNSON However, his responses during this test were nearly within his preflight envelope and by responses I mean to include his heart rate response, his blood pressure and the amount of enlargement that occurs in the legs when blood is drawn into them by the negative pressure. Heart rate responses were slightly elevated and on the second run on the Commander the temperature was considerably lower, around 88 degrees, his responses too were almost within what we've seen preflight. The heart rate and blood pressure were only slightly different. In the subsequent tests which have included 2 on the Pilot and 2 on the Commander and 1 on the Science Pilot, the 3rd one on the Scientist Pilot is to be done this afternoon. There has been a slight trend toward a increasing heart rate during this stress, but all in all the tests have gone very well and

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I think are showing us what we wanted to learn. I did not mention the leg volume responses, they were quite different than what we've seen preflight in that what we use as an indicator in the volume of blood that's drawn into the legs showed probably 1-1/2 times the magnitude that preflight levels have shown - prelflight runs have shown. And I think this is probably just an indication of the starting point, they have less blood in their legs being in a zero-g condition when we start the test. So up to this time all of the runs have been good and I think all of the responses have been essentially what we expected to see. If there are no other questions I'm through.

PAO I think we can go on unless somebody got a some compelling question at the time. Then we'll catch questions at the finish.

SPEAKER Okay, Mr. Michel.

MICHEL On the M171, Metabolic Activity Experiment, we have run a total of 5 runs to date. 2 on the Commander, 2 on the Pilot and 1 on the Science Pilot. We do get an additional run on the Science Pilot this afternoon. I think the most outstanding finding we've - we've got to date was - was the fact that the restraint - the ergometer restraint, which is to hold a man in optimal position on the ergometer - -

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MICHEL - to date was the - the fact that the restraint, the ergometer restraint which is to hold man in optimal position on the ergometer has been inadequate especially at the third level of exercise. Now the restraint was designed and tested in water tanks in zero g and it worked fine but we are seeing a decrease in the crew's mechanical effenciency doing work especially at the third level - the high level of their protocols and this is demonstrated physiologically by elevated heart rates and changes in their respiratory gas exchange. Now on their own, the crew has been trying to attain a better positioning on the bicycle to do the work and evidently has succeeded. The commander's run yesterday was done or accomplished without using the restraints. He just used the footholds and his arms on the handlebars and we obtained data which compared very favorably with what we were getting preflight. So hopefully they have whipped the efficiency problem and we should start getting good data. It does cloud the issue when you - you're looking for changes in degradation exercise response and you have this mechanical efficiency change.

PAO Okay, let's take the gentleman - -

QUERY It sounds like what you're saying is that you're collecting data just fine but you don't have enough data yet to make any projections and see what's happening. Is that about right?

SPEAKER Well, yes. We have two runs on Paul Weitz. We - both runs indicated that his efficiency level was approximately the same and we saw no change on those runs. Now the two runs on Pete, the second one was done without the restraint and we got data on this run which approached our preflight baseline data. So based on this limited data, I'd have to say that we're not seeing any significant change in their ability to do exercise.

QUERY Sir, would you define what you mean by a decrease in the crew deficiency? How did you arrive at that?

SPEAKER The way the experiment is designed is the - we had three sets of workloads which the crew have to perform. In other words, this is a setting of resistance on the ergometer and these were established by knowing what the crew's maximum capacity was. We used these same set of work levels inflight and an individual is usually about 20 percent efficient. In other words, you do about five times more physiological work than you do external work to the environment. And this is where we saw the change between how much physiological work he had to do for a given ergometer setting. In other words, he was not able to do - he had to do more physical work for the same resistance setting on the ergometer because he was not optimally restrained.

QUERY what extent are they using the ergometer for exercise and if so, how do you figure that into the deconditioning that might be going on. In other words, can you allow for the exercise they might be doing when you're analyzing the deconditioning that's going on because of zero g.

SPEAKER The crew's personal exercise is just that. They select what they want to do. The only requirement we have is that they tell us what they did, and the frequency and the protocols or levels to which they did this. We get a - for example, if they use the bicycle ergometer as the exerciser for their personal exercise, they are required to tell us the time they were on the bike and also the total watt/minutes accumulated during that time. Now to specifically answer your question, this is hard to relate back to their performance on the experiment except we will have records to show just how much each crewman did exercise on a personal basis.

SPEAKER It's hard to say at this point, you know, just what that data really, really means in the final analysis. And this is true I think with where we are. We - it's hard, in fact, I think it's rather impossible at this point to really predict anything as to where we're going and what we're finally going to see, the middle, half-way point or the end of the mission.

SPEAKER For the most part, I think they're using their experimental protocol the same levels of stress for their personal exercise periods.

QUERY I think this is the 13th day and our record is about 13 and 1/2 days or something like that with Gemini 7. Here they've had more chances for exercise and room to move around, have you determined anything from what they've said or from any of your data in comparison between the condition of these astronauts and the condition of the Gemini 7 astronauts?

SPEAKER We did not perform an exercise tolerance test during Gemini so there's no way to compare this. We did on the last three or four Gemini flights do an exercise test, a variation of this test postflight. However, we could not get at the crew in those days until they got back to KSC so it was approximately 24 hours after flight. And we did not get significant differences. We did see trends of a degradation in their response but not significant and I believe this was due to the fact that we couldn't get at them soon enough.

QUERY Yes, but those were 3 day - 4-day missions. And I'm talking about the Gemini 7 mission which was nearly a 14-day mission. I realize you don't have the data - you didn't have the data on them - - but do you have anything from what the crew had said or from - from your cardiograms and what not that would indicate to you a comparative condition for the Skylab crew compared with the Gemini 7 crew?

SPEAKER No sir. Not in the exercise area.

SPEAKER I think what John's probably looking for is a general assessment of verbal and I guess telemetered kinds of things.

SPEAKER Okay, I don't guess - really to answer that one, I don't think that we have stopped at this point in time to really try to look and make any positive comparison with the - with the results of those two, Gemini 7 and the Skylab mission as such. The - I think from the performance and the well being, I think that we're seeing something that is fairly comparable in those crews and also I think you can relate that to the Apollo 7 missions - I mean the Apollo missions of 10, 12-day durations whereby they have come back with just about the same amount of degradation in postflight analysis. And inflight, I would think that probably this crew has really had a chance to move about more. They've had a chance definitely to exercise more. And their performance to date has, I think, has been one that's outstanding. And they have really experienced no illnesses and certainly none - no motion sickness. Now here again we didn't see that in Gemini flights either but they didn't have the opportunity to maneuver around either. So I think that the - I think up to this point in time, I think you know what we're seeing is fairly comparable. Now the inflight samplings, the urines, bloods and all that'll be brought back of course is going to shed a lot of additional light and information upon the crew. But we can't look - we can't really tell what that means until we get it back.

QUERY Would you say that the Skylab astronauts are in better shape after their 13 days than the Apollo astronauts after their 10 to 12 days?

SPEAKER The Skylab?

QUERY Yes.

SPEAKER Are as in better shape after 13 days in the Apollo?

QUERY - - in the Apollo as compared - -

SPEAKER Well, I think you've got to look at - you know, at more or less individual missions. Now we've had as you know some problems within Apollo. We were certainly having a problem with Apollo 15 which I, you know, I don't think that that is - could be said to be in as good a shape at this point in time as the Skylab crews are. The other crews I think have all looked to be in excellent shape by the end of that mission - of their particular mission. And only in the postflight analysis did we really have a chance to say "Yes" there was any differences from their prelaunch baseline data.

QUERY I guess what I'm asking is the results that you're getting from your inflight experiments after 13 days, do they compare well with the postflight experiment that you did on the Apollo astronauts after they came back. In other words, does the degradation seem to be about the same?

SPEAKER Well, let me see. We're - -

SPEAKER We're not seeing the same amount of degradation at this point that we saw postflight Apollo.

SPEAKER I think that's the point that we made earlier that they're really not far away from the prelaunch baseline at this stage.

QUERY Maybe I missed this earlier, but if a group of experts and physicians saw this data without knowing where it came from, could they deduce that these men have spent 12 days in zero g? Is there, what would give them the clues? Let's say there were some clues in there that are peculiar to zero g life at 12 days.

SPEAKER Well, not ever having had a chance to really look at any inflight data during zero g, I don't think anybody could. That's really what we're here for within this mission is to collect that inflight data and really understand what changes are occurring during the early adaptive periods to this environment and through the more prolonged periods of exposure to zero gravity. Out of this we certainly hope to identify any - if there are any changes, what changes are directly the results of the environment that the crews are working in. But we don't have any - we don't have any - -

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SPEAKER Out of this we certainly hope to identify any - If there are changes, what changes are directly the results of the environment that the crews are working in. But we don't have any, we don't have any guidelines on, you know, to measure that against as yet. There's what we're collecting. But so far there's been nothing peculiar unusual or that would come up that would say this is (garble) I think that probably I'll let them answer this after I do. I think the - the one significant thing is what Dr. Johnson talked about earlier is the change in leg volume, is really the most - most significant thing that we have seen. We have seen increased heart rates. Well I think the resting heart rates prior to the exercise runs are comparable to base lines but then we have seen increase heart rates over the base lines during the various exercise levels. Is this right, Ed?

SPEAKER That's correct.

SPEAKER Right. Now this has not been an alarming increase but nevertheless it's a change. And I think it is significant and I think it's indicative of the zero gravity condition that the crews are in. Now what's - how - how this is going to continue or progress, that's the thing we want to see. So far it looks to be fairly stable.

SPEAKER We can't forget now that we have had this dificiency change which does increase the heart rates. It is kinda hard to say that all that heart rate increase was due to efficiency or part of it was do to weightlessness. We can't separate the two right now, but based on the run that we got with Conrad, yesterday, in which his efficiency had improved, the heart rates were much closer together to the base line.

QUERY I'm putting the same question, I suppose in a slightly different way. Is it possible to say how this data compares with what you would expect to see, say from someone who had been lying in bed for 13 days?

SPEAKER Probably, it is less, as far as the heart rate is concerned, than we would see after a similiar period of bedrest and getting this same type of rest. But I was thinking that the only inflight comparison that we can make from previous flights is in their resting heart rates and this would be a tip-off, if you knew what they were on earth, before they had gone into flight. And their resting heart rates are very low, just as we have seen in most of the crews of Apollo. On the order of 10 percent below their resting heart rate prior to launch. And, I would say for the negative pressure stress, that they show much less change

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after 13 days than we saw on the ground after 12 day flights. But, we can't really make a valid comparison, until we see this crew postflight.

QUERY To try to expand a bit on Abbey's question. Just looking at the outward signs you see after 13 days in Skylab and try to compare that with just and outward signs you saw inflight in Apollo. Isn't it true that most of the Apollo's crews experienced motion sickness or nausea? Comment that way on a comparison basis, just outward signs.

SPEAKER Well, Jim, I think the - I think most of the Apollo flights, not all the crewmen, I for the life of me right now I could not give you a figure on just how many. But yes, we saw this varying degrees of motion illness during this adaptive period to the zero gravity environment. And I think something over 50 percent of the Apollo crews. Now this was from just periods of maybe two hours up til the, I think the max was about five days, with Jim Irwin. I think he was the longest one, and I forget now, Rusty - of course Rusty had some problem more so than some of the others. And these - here again, these are an individual susceptibility to that thing. Just as it is here on the ground. But you are right in the assumption that I think most of them did experience certainly more than what we have seen here. And it is amazing because, I think Pete and Joe definitely did expect to see some of this, and it's rather surprising that we haven't.

QUERY Would you care to speculate on why this is. I mean you knew for instance that Pete was in an Apollo crew that the others hadn't flown. Would volume and ability to move about in such a spacious area have anything to do with it?

SPEAKER Well, we have thought so. Definitely we have felt that the more of freedom-of-movement the crew has in the early hours and days of the mission, the more likely we are going to see this. We began to get this feeling back when we were flying Gemini and we never saw any of this in Mercury or Gemini. And yet the Russians were telling us that they were we it, and they had a larger spacecraft, in volume. We really didn't appreciate the fact at that time, that it was probably related to the ability to move about until we saw it in Mercury. And that was the first time our crews really had a chance to get around, tumble, and perform. Then we appreciated the fact that this is what it was and this is what the Russians had been seeing. We certainly have expected to see it in Skylab. But I, the crew, this Skylab crew has undergone some training with the M131 equipment, the chair. They

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have gone through some of these head movements during the pre-flight period. And I don't know at this point, really, whether that has had some effect here and some beneficial effect to them, in this early adaptive period or not, Jim. It is quite possible that it has. And I think Dr. Ashgraybill of Pensacola, feels that he can train them if given the proper time and that has been one of our big problems. But they can be trained to eliminate or reduce this susceptibility.

PAO Yes, let's take two more questions. I guess that we'll be coming up pretty fast on a lot of air-to-ground and additional TV coverage. Gentleman there.

QUERY Apparently, Pete underwent his first M171 on May 29 and didn't get that information until sometime yesterday about the PVC. Now he was tested again yesterday and apparently he has been told that everything is fine. I wonder why it takes 8 days to get information to him one time and less than 24 hours the second, sir?

SPEAKER Well, first run, we, uh, we really didn't know it was there and we had made no special effort to move the big system and to push it in here. It was coming through the normal course of events that slowly but surely go it back here to the Center. This again is part of the big data problem, that you know that we have had. Of course, after we saw that and then we were aware of it, we looked at that data and we did not feel as I thold you yesterday, that it was of any major consequences with regards to the performance of that experiment and certainly no ill effects as far as the crewman was concerned or his health. But then we were approaching a period of 8 days since we had seen that first run and here we are facing a EVA tomorrow and we wanted to make sure that prior to going EVA we would have a chance to look at that data. Now if we had waited for the normal 4 days to get it back here, it would have been here after the fact. So an effort, concentrated effort, was made to bring that data in, and that is how we got it that soon.

PAO Let's take the final question here with Abbie Brent.

QUERY You say that the leg volume changes are a surprise. Can you go into that a little bit more and what does this tell you about the environment of weightlessness if the leg volume should have shrunk so much from the beginning of the test.

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SPEAKER I - to state another factor in this - one of the measurements that's made prior to the lower body negative pres - test is a simple tapemeasure measurement around the calf part of the leg. And we were some - we see decreasce in this measurement postflight in nearly - I think in every crewman practically that we have measured - the first measurement that we made after over three days of space flight showed a rather marked decrease in the size of the calf and subsequent measurements on this crewman and the other crewmen have shown quite a marked reduction in calf size. Now a part of this loss is due to fluid loss from the vessels of the legs which are normally filled under gravity conditions. Then when we start at that point and measure the increase in the leg size during negative pressure, the increase is due to blood being drawn into the legs. Now we see a greater volume, a greater percentage changes would be more accurate, than we have seen in their prior flights. In prior tests.

PAO Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

CHANGE OF SHIFT BRIEFING
Johnson Space Center
June 6, 1973
9:00 a.m. CDT

Participants:

Charles R. Lewis, Flight Director
S. A. Liebergot, EGIL
John E. McLeaish, PAO

SL-II PC-28A/1
Time: 09:05 CDT, 13:14:05 GMT
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PAO Okay. We're ready to get started. That's assuming that we have some members of the press in attendance. Okay - Ah ha, came in the back door. - -

PAO Okay. With us today we have Flight Director Chuck Lewis and also, with Chuck, Sy Liebergott. Sy is the EGIL flight controller and is also, at other times, and I guess in a sense today, the ECOM flight controller. At this point, I'll turn it over to Chuck for his status, and then we'll throw it open for questions.

LEWIS Okay. We encountered a couple of problems last night. CBRM 17, for the last few hours, has been indicating only about two-thirds of its normal output during the daylight period. And I brought Sy Liebergott to answer any questions with regard to that. And over the last couple of days, I've been asked several questions with regard of PCGs, CBRMs, and battery capacities; so I brought him to help me on that. In addition to the CBRM 17, the SO55 experiment, we had several high-voltage trip offs there. And we've ceased operation on that experiment until we've had a chance to look at the data. With regard to flight planning last night, we're looking at the so called crew day off. The crew, as I think I reported yesterday, has mentioned to us that they're willing to go ahead and run experiments on their crew day off. So we're looking at what experiments we might run on Friday. And we haven't made that decision completely yet, but that's in work. That's basically it.

PAO Okay. Let's take questions. Bruce Hicks.

QUERY Chuck, I'll start with a couple for you. What about TV today? What TV and - You got a good time hack on that, by any chance - what real time TV during the SIM?

LEWIS I didn't bring the Flight Plan with me. I think they bring a package over here, the execute package, and I don't recall the specific times. But there's - As I recall, there are two passes over the continental United States, where they have it set up. And I don't remember the times.

PAO I think, as a matter of fact, Bruce, Doug Ward or one of his people has some precise time hacks that you can get.

QUERY I wonder if Sy could explain to us, in terms we can understand very well, the status of all the batteries?

LIEBERGOTT Okay. You want the airlock module and the ATM. Okay. Let me start with the CBRMs, the ATM power system. Up till 10:00 o'clock last night, when this anomaly started again, which I'll get to on the CBRM 17, we had 16 out

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of 18 batteries, CBRMs. And we're planning our EVA around that capability. Of course, with the anomaly we have on 17, that kind of throws a hitch in it. But I think we can still handle it all right. The anomaly on CBRM 17 is something that we saw occur back on day 1, (garble) 44, and - where the output was not constant of the regulator at the CBRM, the regulator to the loads. And it went away by itself after about 10 hours. Now this is the kind of problem that we really can't do much about anyway. This problem occurred - started occurring again last night about 10:00 oclock, at 157:02:55, and that means it had gone on, I guess, for about 11 hours. Maybe it'll go away by itself again. But it appears that we do have a short in - in one of the transistors, upper transistors in the regulator of CBRM 17 that would seem to explain it. It's still - There's not much we can do about it. Right now we have like two-thirds of a regulator we can say during the day periods. A full regulator 12 minutes after sunset, in the night periods. Takes ah - This is a function of the voltage into the regulator. When it drops below a certain level, apparently the transistor breakdown point is not exceeded, and it starts allowing the regulator to put output full. So what we're planning there is - if it breaks completely, we're planning to power down some more things to take care of that for the EVA. And I think we can handle it. So right now it appears that we have seen 16 out of 18 CBRMs with a possibility of 15 out of 18. And, as I said, I think we can handle that for the EVA power loads. The airlock module power system, the PCGs, we've got - you know, we've only been able to charge perhaps four PCG batteries. That's 5, 6, 7, and 8. We've been successful in charging, with what limited solar panel capability we have, PCGs - PCG batteries 5, 6, and 7 full up. Eight, we've had a problem with. It's just not getting enough solar panel output. And we just can't get enough output out of the charger or keep the charger turned on long enough. So we have at least three of the - that group of four PCGs charged up full - batteries charged up full. That's really milking very little output out of those SAS panels that are exposed to the sunlight. So at least we have three good - you know, we have our maximum poten - capability now for any emergency power we might need. That's what we've been trying to do with the airlock module power system in the event, you know, we had a major problem with the automatic trip offs of the CBRMs like we've had in the past. None of those automatic trip offs have reoccurred since we got back to solar inertial. And we've got the batteries up full. Relative to the capacity, I guess, of the CBRM batteries, which seems to have been asked, I guess we can say of the four batteries, which are the hot ones that got

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pitched up into the Sun, - In fact, CBRM 17 is one of the CBRMs that was one of the hot CBRMs. I suppose we can say we have greater than 10 amp-hour capability out of all but these four that are operating. These four, as probably has been reported before, are running anywhere from 10 amp-hour capability - 9 amp hours, 8-1/2 amp hours. And enhance we - you know, we said the system was degraded. And there's no real way to tell what the capacity, the real capacity, of the batteries are unless you run a - what we call a battery capacity verification test. And that's where you discharge the battery completely. And then charge it back up and see how much you get back into it. We can't do that. We don't plan to do that until the end. It wasn't nominally planned to do until the end of the mission, just to get a check on the battery degradation. If we get wing 1 out, we'll gain roughly 4000 watts, which, as has been stated before, will get us out of the woods on power. And we should be able to do a pretty normal mission. There's probably a lot of things I can say, but go ahead.

QUERY Follow on question here. Then you don't know whether or not the other four PCGs in the airlock module will work once you get the wing out. And in the event that you have some kind of a massive trip off the regulators, you can immediately throw on these three airlock module batteries, and they will - you think they will work and take over the slack if there's a problem?

LIEBERGOTT Maybe I got confused, or maybe I confused you. The - You know the trip offs, the automatic trip offs, have been occurring with the CBRMs, okay? And what we're worried about, if we had too many that trip off at one time, at least we would want to make sure the air - what airlock module batteries we had available to us were at least full up as we could make them for emergency power. And we've been trying to accomplish that, and we've got it just about as full as we're going to get it right now. Now, you said something about in the event when we get the SAS, the airlock module, the OWS, SAS wing deployed, it - -

END OF TAPE

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LEWIS You said something about in the event when we get the SAS - the airlock module - the OWS SAS wing deployed - There is no reason to believe they won't work - all of them won't work. You know, I can't tell you it will, but there's no reason to believe it won't.

QUERY Back on the CBRM 17, we're getting two-thirds of the regulation during the day and then full regulation power out of it 12 minutes after sunset. This would indicate to me that the problem with the transistor then is when you're feeding directly from the panel into the bus and not from the battery, in powering direct off the battery - the stored power in the battery. Is that -

LEWIS Yeah, I need to give a little more detail. The - during the daytime the SAS voltage is quite high. You know, it'll come up like at sunrise 60 volts and then kind of peel off down to 40 volts as it has to supply more and more charging current. Okay. When the charging is over, it'll trip back to about 55 - 50 - 55 volts, when the load is removed. What happens is the higher the voltage, the greater we have exceeded the breakdown point of this transistor more than 1, and the more we can feed the short. Okay. The less and less voltage we have available to us, the less power we can feed to the short, and it does go down. Okay. Now during the daytime the voltage is quite high. It never drops below 40 volts out of the SAS panel. The SAS is feeding the regulator during the daytime. During the night the battery feeds the regulator. So, consequently, the voltage is so high, and it can really feed this short, because it's really forcing the transistor more and more into this breakdown region it's in. And we can only get a maximum, like two-thirds of its output. Normally it runs about 9 amps, feeding the loads it's feeding; so we don't see any more than 6 - 6 amps output. During the night time - okay, when the battery is feeding the system, feeding the loads, the battery voltage to start with is a lot lower. In fact, it's like 32-1/2 volts to start with. It's quite low relative to the SAS panel output. What happens is 12 minutes into daylight - into the night, it's been feeding, you know, 10 amps, and its voltage drops. And its voltage - when its voltage drops, we noted, to 31.7 volts, it - the magnitude of the short is only down to about 30 watts. And when the voltage drops down to 31.4 volts, this short goes away. So obviously we're not - we have - that is the point where we're forcing the transistor into breakdown. So at night time - at 12 minutes into night, we have a full capability.

QUERY Well, then apparently the more volts you've got feeding in there, the worse your problem is, or the worse the drain - the short is. Would this then indicate if it

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doesn't clear up by itself, as it did back on day 144, that that transistor could even get worse, and you could even have worse problems, and the whole thing could go out on you?

LEWIS Oh, yes. It could be. That's right. It could be we could lose this CBRM. And what we're doing there is in our power analysis assuming the worst case and assuming that for the EVA, which can be a very high power drain on the system, that we should assume that it's not going to be there. So we're running two analyses: one, it's going to be there; the other, it's not going to be there. And we think we can power down sufficiently to take care of all that.

QUERY A couple here. Could you just clear up for me - when you get the SAS wing hopefully deployed, you have no reason to - you have no reason not to assume that you will be able to use all eight of those batteries?

LEWIS That's right.

QUERY You simply can't tell at the moment. Is this because you can't, in fact, with the low power trickle at the moment - you can't feed across to those four?

LEWIS Right. There's nothing to feed the batteries so we can tell anything about the performance.

QUERY Second part. Could you just outline roughly what the systems are that require high power during EVA and roughly what the level of that is?

LEWIS Oh, boy. I hadn't gone over that.

LEWIS Sy, you probably ought to just address an addition to what our normal base line is rather than try to go back and reconstruct the entire power profile.

LEIBERGOTT Well, normally the daytime modes are run around - well, we're maintaining 4,000 watts, no more than 4,000 watts orbital average and not discharging the batteries any deeper in the CBRM's than the 30 percent. Now what's happening is that the EVA due to the additional lighting that is required - we're goint to turn on all the docking lights - I think it's an additional 900 watts - it costs 900 watts to do the EVA. That means we've got to power down by 900 watts in order to equalize things. And we've - the major users of power for the EVA are - is the lighting, and to achieve this - of course in the workshop, in the OWS, we can just about - we can shut it down completely. Shut all the fans down, all the lighting down - you know, just forget it for a few hours. There's a lot of things we've had to power down, and, you know like I said, I don't have the list here, but we've had to account for about 900 watts power down, and we've accomplished that. That's a pretty general answer to your question.

QUERY But, generally, the very large item is the lighting which you need, because you're going out in the in the first case in - well in the night time, and you'll have at least one other night time pass probably.

LEIBERGOTT The suit coolant pumps and the lighting. The lighting especially was the biggest.

LEWIS That's docking lights he mentioned and also EVA lights. There's some EVA lights.

QUERY While we're on batteries, I had another question that isn't exactly related. But I understand that the manufacturing - in-space furnace operates on its own battery, its own inward power supply - a 500 watt battery.

LEIBERGOTT Which - repeat your --

QUERY The furnace that was built at Marshall for experiment has its own power supply separate from either the airlock module or the ATM power. Is that right?

LEIBERGOTT I think that's right. Many of the experiments have their own batteries that we don't interface with at all.

QUERY Okay. That's 500 watt capability. Is there any way to use that to augment what you already have on the line for - and to recharge it eventually?

LEIBERGOTT I can't answer that question. Obviously anytime you're talking about tapping of the power sources, you're talking about splicing into our bundles. And a lot of times that's not even possible, because you don't have cables available or the wiring runs outside the vehicle and you can't even get to it without an EVA; so I really can't give you a satisfactory answer to your question.

LEWIS I know that that has not been considered. But be reminded we started the CSM for additional power, if we need it.

QUERY How many - with this new battery problem, how many watts do you lose?

LEIBERGOTT About 200.

QUERY Was it a total of 200? I thought the - if the whole thing goes out, but what are you losing now? Or are you losing it?

LEIBERGOTT Well, right now we have at least two-thirds of a CBRM, two-thirds capability.

QUERY Last night they were talking about half. Y'all were on then when this happened. That's what the PAO said.

LEWIS Well, we may have said, in talking over the loop, a half to a third, but it looks like it's closer to a third during the daylight period. When we see the drop after sunset (that 12 minutes I talked about), it looks like about 50 to 60 percent we're dropping (garble) its output before we get back up.

LEIBERGOTT That's right. That's just after sunset.

LEWIS That's what I said. For about 12 minutes even (garble) talked about just after sunset.

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QUERY He was talking about 112 watts - it apparently is not that much then that you're losing.

LEIBERGOTT Not quite. And I think the output of the CBRM is between 200 and 250, in that range.

QUERY Would 100 watts - would that be a fair number to use, or is that still too high?

LEIBERGOTT Well, in (garble) average, that'd be the worst case - if we told them we lost 100 watts - worst case, which we can handle an additional power down if we have to. We can handle, I think, scraping a little bit, without going to the CSM, the loss of the CBRM; that's what we're planning. I mean the worst case planning - we're doing it.

QUERY While you're on the CBRMs - there are two CBRMs that are down and one that is a little flaky. Is this any kind of (garble) I mean this is time that's passing. Are you in the position of worrying about more of these things going down the drain as time passes?

LEWIS We're worried about them all the time. Every minute. But these are different problems now with each one.

QUERY They're different problems, but is there any kind of statistical thing coming up that you can say, "We're apt to have some kind of problems on two more CBRMs before another month is out"?

LEIBERGOTT No, I don't think so. These things should be qualified to last well beyond all three missions.

QUERY Chuck, I'd like to clarify this - the power available situation - do you say you had 4,000 watts available for the daytime?

LEWIS Yes, that's right.

QUERY Total?

LEWIS It's more than that.

LEWIS We've planned for no more than 4 - You talking about our operations that exist now or has the last few days? We've planned for no more than about 4,000 watts --

END OF TAPE

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SPEAKER It's more than that.

SPEAKER We planned for no more than 4 - you talking about our operations as they exist now, or has the last few days? We planned for no more than about 4,000 watts average, orbital average. We try to maintain our loads less than that. That - there are times when you peak above that for a short period of time, but we're talking about average. Now, with regard to CBRM 17, looks like right now we've lost 8200 watts perhaps out of that. If we lose CBRM completely, we're talking probably about 250 watts. Full amount of decrease, take from the 4,000 and maintain below that average.

QUERY Yeah, in other words 4,000 is kind of your red line so you went below that to give yourself a little pad, and now you've got about 80 watts out of that with a (garble) problem. And what is it in the night time? What is your budget in the nighttime?

SPEAKER It averages - well during the crew workday still about 4,000 or less. Okay, we - but at night we're watching about 3700, 3750 during the sleep period.

SPEAKER Bruce Hicks.

QUERY Just before I get too confused here, we talking about 4,000 watts is what you have capable or 4,000 watts is what you're pulling?

SPEAKER Which you're using -

QUERY What have you got?

SPEAKER Maybe 4200, maybe 43.

QUERY Okay.

SPEAKER There's not much margin there. If we try to not discharge the batteries too deeply. We're trying to maintain, always getting back what we take out, plus a little bit each rev.

QUERY Okay, then if we lost CBR 17 we'd be down a little bit. We'd be down just below 4,000 - what we have to use, and it takes what just to maintain the workshop and CSM? I'm talking about in reference to if we don't get the SAS wing out and we - our fuel cells run out, we're looking at those last few day's flight of running just off of the power from the ATM, can we still maintain it without that CBRM; and if so, how much further? How many more can we lose and not maintain?

SPEAKER I guess - and Sy should answer this; we'd have to look at what our bare baseline is just to support crew and I think Sy's got -

LEIBERGOTT Well, I haven't worked with the numbers but it occurs to me that - probably have to give up the OWS.

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And you especially have to see - if you want to keep the CSM there after the cryos are gone and the fuel cells are gone. Even with the supply of the CSM, you know, that's at least 900 watts and is perhaps more accurately 1000 or 1200 watts. If you're going to do that, you've got to give up something else.

QUERY That's without CBR 17 and the OWS?

SPEAKER No, I'd almost say even with CBRM 17. It's just like doing the EVA. You got to give up an awful lot to get the EVA.

QUERY Okay, even if you have that and you're missing 2 now you've got 16 of them and you don't have anymore power, you don't get the SAS wing out and so forth. You're saying we'd have to give up the OWS and say keep at what, the ATM and MDA operating only?

SPEAKER Do an AM on - you know, out of my - out of my scope now. If you had to give up the OWS, it's obvious that you'd have to do an AM mission. Airlock module mission; MDA mission.

SPEAKER Yeah, in a case like that, for example, we - if that were the - we got into that situation we could operate the MDA the ATM experiments and periodically go into the OWS for food, that kind of thing. This is the kind of thing we looked at very early. It's a possible mission alternate.

SPEAKER Are there any other questions? Okay, we'll adjourn.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 5, 1973
7:08 p.m. CDT

Participants:

Don Puddy, Flight Director
Dr. Royce Hawkins, Medical Director, Life Sciences
Phil Shaffer, Flight Director
Don Green, PAO

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6/5/73

PUDDY Those old familiar faces.

PAO All righty, let's get started with the Change-of-shift briefing. On my immediate right is Phil Shaffer. On his right is Don Puddy, who is the off-going Flight Director, as you know. And we expect momentarily to have Dr. Royce Hawkins here. So, while we are waiting for Dr. Hawkins and without any further ado, let's start with Don.

PUDDY Well, let me start off with my favorite two subjects. First, we've had no additional TACS usage even though we did have an EREP pass today. Secondly, the temperature remained very stable today between 75.8 this morning and 76.7 this afternoon, so I think we're just about reaching a stabilization point in and around the area that we projected to you a few days ago. We went ahead and, as I talked with you last night, we have continued to charge what we could of the AM batteries, using OWS solar wing-1 and we now have three batteries, that's number 5, 6, and 7, that are essentially up to a 100 percent state of charge. The cal rock problem that I talked to you about last night, from the data we've been able to gain today, looks like it was probably a wind elevation air type problem. And since these rockets do not have a guidance system, it essentially, was going off the range and had to be destroyed. There was nothing wrong as far as the scientific payload package itself was concerned. There was some mention today as far as the data that we had available. And let me clarify one point to you. As far as the VCG or the M-171 runs, as you wish to call them, to date we have had a total of 14 runs. As far as the total number of these runs that have been reduced from a pure scientific standpoint - this is what we say completes all - is completely smooth data, it has everything in it, every squiggle, such that it meets all of the scientific objectives for PI investigation. We reduced - we have completely reduced six of these and of course have eight left to go. As far as those that have been reduced to the standpoint where they satisfy the medical requirements, all 14 of those have been looked at and I'm sure you have received information the latter part of this afternoon that the data that was done on the Commander today has been reduced and looks good. No problems. Today we did have EREP pass number five and a 12-minute data tape started over the Idaho Nevada state line, came across the Rocky Mountains, and down into the Gulf Coast of Mexico. We were a little disappointed although I think we did get some good data, from the standpoint of cloud cover, and the tornadic activity that was in and around this area. We got some data there that we didn't anticipate, but we didn't get some of the other type of data

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that we had hoped to get over the HATS area, strictly from the standpoint of the clear weather studies. We did get one of our prime data points, however, which is the Shell tower, which is located about 25 miles off the Galveston coast. We also completed 3-1/2 hours today of ATM viewing time. As I'm sure you're very well aware, we had the M092, M171 run on the Commander, and an M131 run on the Science Pilot, and this evening we have scheduled as I briefed you last night, an EVA review session with the crew between 7:45 local and 8:45 local. And that will occur over Vanguard, Ascension, and Guam. Looking at tomorrow's flight plan, when I talked to you last night we were talking about the EVA simulation being accomplished in the afternoon time frame.

END OF TAPE

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PUDDY - - last night we were talking about the EVA simulation being accomplished in the afternoon time frame. We continued to look at that some more today. And I've elected to move that into the morning time frame. It is presently scheduled right now at 14:57 Z or 9:57 in the morning for a 4 hour period of time. There happens to be some TV associated with that, towards the latter part of that. In fact, over the Goldstone Mila area, we have essentially 16 minutes of real-time TV that will occur during that particular EVA simulation. There was a question raised, as I understand, about the exact amount of coverage that we had - ground station coverage that we had during this EVA sim. And I ran a quick calculation on that, and of the 4, excuse me, of the EVA. Of the 4 hours total, we do have an hour and 13 minutes of that that is over ground station coverage.

SPEAKER Don, I think that sim is only 3 hours long.

PUDDY Okay, we may have changed it. Phil has been working as the off-line Flight Director along with Milt Windler, who will be on console during the EV activities, and he may want to say a few words or answer some of your questions. And let me also add that tomorrow I believe it's scheduled around 2:00 in the afternoon, Rusty Schweickart is going to come over and give y'all a few words as far as some of the details of the exact deployment procedures that he has worked over at the Marshall Immersion facility. Phil, do you have anything you want to add? We can open it up to questions. Your choice. I'm through.

PAO Dr. Hawkins, would you like to say a word or two. We've already had the announcement over the air. So, if you have no further words, we'll go with question and answers.

HAWKINS I really don't have anything further to add to that.

PAO Fine. Any questions?

QUERY I haven't seen the flight plan, I've been out a lot today, but I presume that most all of tomorrow and all of Thursday for sure will be devoted to EVA. Will they do anything else tomorrow besides - let me rephrase that. What else will they do tomorrow?

PUDDY Okay, Phil may have some later information, the latest flight plan I have we're still carrying a 4 hour EVA sim period. Coupled with that we have about 2 hours and 15 minutes of ATM viewing time. We also have an M092 M171 run on the Science Pilot. And we have

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another complete night side pass on the S019 experiment. We also have scattered in there some of the miscellaneous housekeeping activities and some of the experiments that we try to accomplish where we have short time blocks, the M487 type experiment, where we're looking around for the crew's comments on habitability future design of space-craft, that type of thing. So, while we are taking out a fairly large block of time associated with preparations for the EVA, which is presently scheduled on Thursday, we certainly are not going into a completely powered down experiment day. I think we'll be more in that time frame when we get to Thursday. We also have some preprep on the EVA which is scheduled in the afternoon starting around 21:45 or 6:45 local, and running that for a little over an hour and a half.

SHAFFER That activity at the end of the day the hour and a half - when they say preprep, it is exactly that. Right now we would intend to get these suits assembled and squared away and some of the gear placed up into the airlock area to get ready to go out and do that. It's done to speed up the day tomorrow. It's not a one for one speedup. The hour and a half we invest tomorrow will not take an hour and a half off the time.

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SHAFFER It's going to speed up the day tomorrow. It's not a one for one speed up. The Hour and a half we invest tomorrow will not take an hour and a half off the time the next day, because it's not that kind of thing, but it'll probably take on the order of an hour off of Thursday's work day by this activity here.

QUERY Do you have a time on when they're going to start the EVA activities on Thrusday?

SHAFFER Yeah, I thought you might be interested in that, as a matter of fact, so our current timeline for Thursday has the crew getting up at the normal time. One of the preliminary plans had them get up a little bit early, but that turns out not to really be required. So we have them getting up at the normal time, about the normal post sleep activity and then about two and a half hours of EVA prep, where we're getting serious about going out. Getting the final gear stowed and getting suited and doing integrity checks and that sort of thing, with the hatch opening at about 15:35 Zulu. That's just before sunset,but we will spend that night pass bringing some of the gear outside using the ATM lights and the docking lights to light the work area and getting ready to go down onto the SAS beam to do the work. Sunrise will occur at about 16:13 and we should be ready to translate on around in the final work area, which is for the EV 2, the guy that does not go out on the wing. His final work area for this purpose is the base of the discone. And they take the tools that are - had their final assembly outside the spacecraft, because of their size, and we would expect the beam to be out on the order of 16:45 to 17:00 Zulu. Sunset will occur 10 to 25 minutes after the beam is out. They will have transferred back to the area of the airlock before the Sun goes down. And we intend at this point to spend that night pass working on the ATM, fixing the S054 door, getting it pinned open, and changing out the S082A camera that does not appear to be working correctly. Sunrise will occur at about 17:46 and we would begin parasol inspection and some TV there, which will be - I believe some of it's live and certainly it will be recorded. At the end of that dayside pass we would be back in the spacecraft with all of our equipments and in the process of buttoning up.

QUERY A couple of questions. The beam will be out, you say, 16:45-17:45?

SHAFFER 16:45 to 17:00.

QUERY I see, and will they be in communication with the ground at that time?

PUDDY The coverage is not very good in this

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time frame. It's very much the same coverage that we had for the SEVA, actually, it's the Vanguard - Hawaii kind of thing. The first part of it may be fairly good, but it's really not very good.

PUDDY I can give you a few more detailed times on that. It looks like we have Vanguard from essentially 16:37 through 16:43 and we don't pick up the Vanguard as Phil has just pointed out until 16:54, when we have a 5 minute pass there. So, it kind of overlaps on either side of it.

QUERY Will this TV that you're talking about, will the camera be outside the spacecraft or will that TV be (garble)?

SHAFFER You're talking about the parasol inspection? Yes, at this point in time, that camera will be handheld by EV 2, which I guess is nominally Joe Kerwin. It will be handheld and he will be up on the ATM truss so they down on the parasol and the wing and -

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SHAFFER - so they down on the parasol and the wing and - -

QUERY At the same time the TV will be showing the wing if it does deploy?

SHAFFER Well, he'll be doing a survey. Okay, and if the wing is out and lighted, I would assume we would see that - that we'll certainly see the parasol, and whatever else is of interest from that vantage point.

QUERY Don, have you gotten any information yet from Marshall pertaining to studies of the parasol's material? How long it might last, whether or not you might have to - during this mission put up the twin boom from Marshall?

PUDDY No, I don't think there's been any additional information. As Phil has pointed out, one of the things we're doing is taking a look at the parasol. Right now, again based primarily on thermal data and the data that we're trying to simulate as far as thermal cycling of the particular material that the parasol is made of - right now we have no indication that we're going to run into any problems. Of course, we are prepared to deploy the other device if that need should arise. We certainly won't leave the spacecraft if there's any problem associated with it.

QUERY Dr. Hawkins, are you thoroughly satisfied - are your colleagues satisfied that Pete is okay and fine and that he should go?

HAWKINS Yes, we feel very comfortable with what we saw from today's run.

QUERY Do I understand that in today's run there were absolutely none of these irregularities at all?

HAWKINS Absolutely none.

QUERY Then what do you contribute the first run to that gave the - -

HAWKINS Well, like I said this afternoon, I feel like that they had a lot of other parameters acting upon the crew at that first run on day-4 the 29th of May of thermal stress as well as fatigue. How much of one or the other, you know, really enters into this thing. It's hard to say, but I think they're - I think no doubt they do contribute to some of this.

PUDDY . have one question that has been passed to me. Let me answer it before I forget it. As far as the EVA simulation which will occur tomorrow, the TV coverage from that is not VTR. It is real-time TV. It is scheduled to occur over the Goldstone-Texas area. I believe the total time on that is around 16 minutes - excuse me - Goldstone Mila. It's about 16 minutes and it occurs right at - just shortly after noon, local time.

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PAO Ed did you have a question?

PAO Okay. We should end it there, then. Thank you.

PUDDY That guy right there - he needs somebody to help him orbital mechanics.

PAO Thank you, Don.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Medical Briefing
Johnson Space Center
June 5, 1973
3:07 p.m. CDT

Participants:

Dr. Royce Hawkins, Medical Director, Life Sciences
John McLeaish, PAO

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SPEAKER You got one coming? Okay, fine. Thank you. Okay, you're ready anytime we're ready to start.

SPEAKER Okay, we're ready to get started. We have with us this afternoon Dr. Royce Hawkins, and I'll turn it over at this time to Dr. Hawkins, who I - I believe has a short opening statement.

HAWKINS Okay, thanks. I guess the - the thing that really has precipitated this meeting this afternoon was the fact that Pete had asked for a private comm this morning. As a matter of fact, I was on my way over, as many of you probably recall, when this came about . And we were scheduled to meet with you and give you something of a rundown upon what the medical experiments have shown to date and concentrate on, specifically, the M092 and 171 data. And Dr. Johnson was to accompany me. I believe Jack King told me he was going to try to reschedule that tomorrow morning and continue with that. This - this private comm this morning really developed over, I think, a misunderstanding on the part of the - of the crew over some information that was relayed to them last night during the private medical conference. Now I'll have to go back and to the start and try to recap some of this for you in chronological history. The - the commander, Pete Conrad, first - made his first run with the M092 171 on the 29th of May. Now, this was - for the most part was - was in the dark. And, as you know, we don't see real time data too often. There's only one or two passes through the 24 hour period that really give us a fairly accurate continous type of coverage. So that you depend upon the dump data coming down. Well, as you probably also know, we've been having considerable difficulty in getting a lot of the data in from the dumps. We have, in fact, even lost some of those dumps, portions of it. And I don't think we fully yet understand exactly what all the problems are, although this is improving. And the time interval between the dumps and the retrieval of that within MSMCC and viewing of that data is improving. On that first run, you'll recall that this was done at the time when the temperatures were still elevated up in the 80's, high 80's. The crew had been through some rather strenuous fatiguing periods during that activation period and sampling and activation of the OWS. And at that time, when we got the data back from the MO - M171 run on Pete, we did see some premature ventricular contractions. Now, this in itself doesn't really alarm anyone as long as you don't have excessive numbers or coupling of these PVC's. And we have in - in a matter of fact, seen PVC's in Pete Conrad prior to the mission as we have in - -

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HAWKINS - and Pete Conrad prior to the mission, as we have in lots of our crewmen in the past. In fact, probably everyone of us here in this room throw occasional premature ventricular contractions. Some of these are - you may be aware of, and others you may not be aware of. All right, this then was 72 hours plus before that information was even available to us. And even at that time then we did experience some data dropouts and we were not able to completely analyze the entire tapes for its full continuity. The cardiologist, the principal investigators - they have been looking at this. Their initial impression was that this is of no medical significance. We felt that it was definitely something that you should expect under the environmental conditions and all at that time. It's certainly explainable, and had no immediate medical significance whatsoever. And it's one data point, and obviously, you're - with anything of this nature, you would like to verify it. If you had them in a laboratory, you'd turn him around and run him again, just to say yeah this is definitely there and no problem. Or if it was a problem, you'd identify it. Now, Pete was then scheduled for the next M072/171 run today. Now this then we were extremely anxious to see, simply because we had seen the premature ventricular cantraction prior to flight as well as during his first run. And we certainly, in light of going to EVA, we obviously want to know everything we can about him. And certainly if there is - should be a problem, we would want to know about it. And that's again the reason for making sure that we did get it in before - prior to the EVA itself. It was scheduled today, as a matter of fact. Now, before you ask me, I haven't yet seen that data. We have not - it was dumped and it will be coming back to us over the ground links. Now, I think that pretty well, as best I can at the moment, anyway, try to sum it all up for you.

QUERY Two questions. First of all, what is a premature ventricular contraction in simple layman's terms. We all have hearts and sort of - Secondly, what was it you said last night in the private medical conversation that seemed to lead to this misunderstanding on Conrad's part.

HAWKINS Well, PVC, a premature ventricular contraction, is a contraction of the heart muscle - the larger chambers of the heart, contracting prematurely, or earlier than they should, if the impulse - stimulus originates at the normal sinus node up in the auricles, the upper chambers, and comes down. This is just a new foci of stimulus, before the stimulus originates and it initiates at just an earlier contraction of what would otherwise be normal.

QUERY Now you said that we've all had them - or may have had them sometime. Do you know it? How would you know it? Would you feel some quiver or something?

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HAWKINS Some people describe them as heart skipping a beat, which is the - or a palpitation or a flip flop of the heart, these are some common type of terms that people use.

QUERY Is there a case - you said something about if it had been successive or if there had been something called coupling that that would have been serious. I don't understand that.

HAWKINS Well, let me say premature of ventricular contractions or arrhythmias, and then you've got a whole gallon of arrhythmias and PVCs are common.

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HAWKINS contractions or arrhythmias and then you've got a whole gamut of arrhythmias and PVC's are common. So are PAC's premature auricular contractions. All it means is that you have a new foci of stimulus and that can shift around and appear other than in the sinus node where normally the impulse originates. Now when you get beyond this point then you get into arrhythmias which take on more medical significance. And this we call the coupling where you get them paired or you get a whole run of them occurring well then you become more concerned about that arrhythmias. This is what we were referring to.

QUERY The second part of my question was what was it you said - or that was said on the medical conversation last night that led to the misunderstand?

HAWKINS The - Now it was decided after reviewing the data and the PIs had had a chance to look at this and massage it over the few days now since they received the data and in addition of trying to get more of it, you know, from the tape dumps that had been delayed or lost - delayed really, I think. They then felt still as their initial reaction that this is of no medical significance. However, we feel that we should relate this information to our on board physician and give him full benefit of all the knowledge we have on the ground in view of the fact that this would be Pete's second run today. And so that was passed up to them last night. Now that - what I say I think that Pete overreacted to (garble).

QUERY Well, I have several questions and you just brought up another one. Was it last night the very first time that Pete was aware of the PVC, other than what he might have felt was the first official notice of it?

HAWKINS Yes, he's had no symptoms - subjective symptoms of it. Now this is the first knowledge, yes.

QUERY And concerning the conference today did Dr. Kraft call you into the conference and were you in from the very beginning of the conference?

HAWKINS Yes, I was.

QUERY Did he call you in?

HAWKINS Yes, he called me in.

PAO Do you have one more question? Let's take one more from Hanks and then we'll go around the room.

QUERY And one more, we've asked before conditions of the crew, any problems and so forth and we've never been informed of this. I'm curious why we haven't and are there any more things like this that you might want to tell us now?

HAWKINS Well, I expected that question because really you know we have told you that from the crew health standpoint they are in excellent shape and this is true.

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Now this is not - this is not an illness. It's a physiological finding which as, I say, can happen to any of us. And certainly you put under varying degrees of stress you could precipitate some of these. Now this is really a data point within the experiment itself really and I don't - I didn't attach any significance to this. Obviously from an operational standpoint when you're going to subject man to further stress and certainly EVA you'd like to have a chance to re-evaluate what is - what his physiological responses are. None.

QUERY Well, if and when you get the results of this last run and he continues to show these PVC's what would be your recommendation as far as him taking part in the EVA is concerned?

HAWKINS Well, Jim, I think the - if we see nothing more, you know, than what we have seen I don't think we're going to alter the course of events at all. You might want to limit the work load that he would - might have to undertake if, in fact, you did receive recurrences of these at the max heart rates that -

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HAWKINS - - if, in fact, you did receive recurrences of these at the max heart rates that we saw under the stress of the examination, but as long as its nothing more than what we've seen, certainly we press on. We will have the crew instrumented with the operational bio instrumentation system and we will have them under observation. We can carefully monitor them.

QUERY How many contractions did he have and how is his experience different from Scott and Irwins experiences on the 15?

HAWKINS Well, it looked like, from the best we could tell, and remember there were some data dropout points there, that he was experiencing about one PVC in about every six or seven beats. And this was over, just over, a little over a minute duration of that maximum work load. Step level three, they call it.

HAWKINS And how did it differ from 15? All right, in 15 we did see some coupling by Gemini rhythms with Irwin. Jim Irwin. And this is what I was relating to awhile ago, that we feel takes on more significance, certainly, than any PVCs or PACs. Now, with Dave Scott, we did see, and we saw other PVCs with Jim too, other than the bi-Gemini run. If you will recall. And with Dave we did see some premature auricular contractions. I don't recall that we saw any PVCs. His, I think, were all originating up there, but they were isolated. Single isolated type of things, and not in duration or frequency , I think it would be roughly about the same for the time period that we saw his.

QUERY But we still haven't had any explanation at all of why Conrad, in the words of the official statement should have been upset. He must have been told something last night, perhaps it might be doubtful whether he was fit enough to do the space walk.

HAWKINS I think - I think he felt that really we were overly concerned on the ground, which is really not the case. And that's really - it was a - it was explained to him straight forward, and as I said, we wanted Joe to - and Pete to, to understand that this had occurred and to know just exactly what it was and the words were even said that we have no concern over this, but we want you to be aware of it in light of your repeating the examination tomorrow, which he did today. And I can't interpret it any other way than he just got the feeling for some reason or other that we were overly concerned, and I guess it was just a break down in our communications, or poor communication of that

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information. And I wasn't really awa that that existed until today, really. But, it did upset him. To think that we would, you know, be overly concerned, because he was feeling fine. Subjectively he's had no problems and Joe Kerwin confirms that. He feels that he's performed beautifully and he has n observed anything wrong upstairs, either.

QUERY Will we be informed promptly of the results of todays tests when you have the information.

HAWKINS You sure will. As I said earlier we were planning on giving you a kind of rundown on all of this this morning, in a more orderly manner. We're really just getting to a point in time where we're beginning to get some data in hand that we can begin to talk to, and then this hit, so it has delayed it. We will obviously give you the quick look report on anything that we get from the dump.

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HAWKINS We will obviously give you the quick look report on anything that we get from the dump.

QUERY How about in the future if you see more PVCs in any of the crewmen, will we be told then?

HAWKINS Well, I guess in light of the interest generated here I'd say yes. Now it's just goes back to what we've talked about here, you know, when this was first identified the PI's - the cardiologists in talking with us and we with them did not feel that this was of any significance and they weren't that concerned - They felt like it needed to be flagged or anything.

QUERY Dr. then this can't be monitored in real time by the observer, monitoring experiment?

HAWKINS No it cannot. This is another point why the message - why we did feel that we needed to let him know. Now if Joe had had the same capability onboard to monitor the vectorcardiogram - electrocardiogram then he would have already had this knowledge but he doesn't have that capability and so we obviously felt in all due respect to our ground support people and him the crew that we needed to relate that to them, give them every bit of knowledge that we have. And that was the agreement that we had had from the beginning.

QUERY Well, but if this condition did develop a coupling conditioning or something like that. Is this something that an experienced observer like Kerwin could spot without monitoring equipment and provide some kind of treatment, stop the experiment there or provide some kind of treatment and let you people know right away.

HAWKINS Well, I think if you got to that point, you know that type of arrhythmia, then I think that you would have some subjective feelings on the part of the subject himself, which, yes, Joe could listen to his heart, he could check his pulse, and you can detect arrhythmia by just the pulse wave. And so he has that obviously, as a backup. Now he's not normally, you know, monitoring in that manner, though. But he obviously would resort to that type of monitoring if there was indication the subject was not doing right.

QUERY Why couldn't you have monitored them today on this run?

HAWKINS I think, well, I don't know that Kerwin kept his finger right on the pulse of the subject throughout that run. However, they did state that they had no problem. That Pete felt great all the way through it and Joe observed no ill effects or deviations from normal. It's kind of the way they put it.

PAO Arthur Hill.

QUERY You mentioned you've had some trouble

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collecting data. I'm wondering if you can give us an estimate as to how much of the original data that you had intended to get you have in fact gotten and what you're missing and how much are you missing?

HAWKINS I don't whether I've got all that information at my fingertips, really. Let's see there's - I think we've lost bits and pieces out of - I think three of the four of sleep studies. I think we've lost one MO-71 run, I think that has not been recovered as yet, and we've lost - drop-outs, where we've lost bits and pieces, although the whole data is there somewhere, but when you get the thing finally pulled together, you've lost some time. Now as I say, those problems are being worked - they're on top of them and I think things are definitely improving. I'd have to go back and review all of our drop-outs and all that to give you a full answer on it.

QUERY Well, are you saying that eventually you will get all this data together or do you feel that - -

HAWKINS I think that it's all there. It may - some of it still be at the ground station - -

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QUERY - - and eventually you will get all this data together or do you feel that - -

HAWKINS I think it's all there. It may - some of it be at the ground station, receiving station, and we may be having trouble getting it back into the MCC. Some of it may within the internal workings of the MCC. I don't know really. I'm not really the guy to talk to that. You ought to have Bill Tendal here to talk to you.

QUERY Do you know what the medical goals you set for Skylab have in any way been compromised thus far?

HAWKINS I don't think so. No, I don't think so yet.

PAO Jerry Bishop.

QUERY Are there any anti-arrhythmia drugs or agents onboard?

HAWKINS Yes there are. We would be - we have the - -

QUERY So it was an emergency thing that you'd thought about before somebody -

HAWKINS Yes, we put these on, as a matter of fact, after Apollo 15. They are still aboard.

PAO Huntsville Times there.

QUERY Doctor, when do you expect to have the telemetry data down on this on the Commander's run today? And once you get it, how long will you need to assess it? And if you don't get any information at all, will you recommend the EVA be held up until you do get it?

SPEAKER Well, I think - to answer the first part of that, I think we're going to hopefully have this data in our hands within 8 hours. No, it could be as much as 24 hours. That's what - it's almost been cut down from that first day that we ran Pete, from about 72 hours before we got the data here to now about 24 hours. I guess where they're really pressing to get it in here, they're going to beat that time. So, hopefully we would have it today within no more than an 8 hour period, elapsed. The analysis of it, here again, depends on the quality as to really how good the analysis is. So far the data we've gotten back is of good quality. And I certainly hope and expect that this would be - - Now if we don't get any back, then we're going to have to use the onboard observations of the onboard physician, and the crewmen to give us some assistance in reaching the decision regarding the EVA activity.

PAO Jim Malony.

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QUERY You answered my first question about if you don't get any data back. But, I was wondering how you got in on the conversation. The air to ground, if I heard it correctly, only asked for Cris Kraft. I was wondering how you got the word that this was a medical problem?

SPEAKER Well Jim, I'm trying to think how the thing really came about. Pete asked for this just prior to the run of the M171. And we had had a delay, we'd had a delay in getting that run accomplished, and we had asked that it be done prior - we'd asked that it be done over the station passes where - and it was set up such where you would have real-time monitoring throughout most of your 92, 171 run. Now we asked for this because, in view of the EVA coming up day after tomorrow and the fact that we have had significant delays in retrieving data from the Centers, we were anxious to get as much real-time data as we could. Now it was right at this time that Pete asked for the private comm and some of the flight director I believe and maybe the Capcom felt that - - Well first let me say there was a delay. They had to go back and repeat a cal in the 92. That put them a little behind. And as such they were not going to get - be over all stations during the entire 171 run. And - -

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HAWKINS - and such they were not going to get the overall, you know, all stations during the entire 171 run, and so they felt like that to live up to the instruction that had been previously telemetered up to them the night before or earlier that morning that this would definitely cause a delay and thus impact some of the EREP studies that were to follow. Now, I think that this was an intrepretation of the ground's part that this was what it was related to and that they were upset and wanted to talk about whether that was a hard constraint that they had to delay that or could they press on. As a matter - as it turned out that was not the issue, really.

QUERY I mean did Puddy, or Kraft, or Schneider, or somebody said Doctor, we think that the Commander wants you in on this or - -

HAWKINS Dr. Kraft asked me to join them as he did Mr. Slayton, and Mr. Schneider, and Mr. Puddy.

PAO Bruce Hicks

QUERY Back to our question, Jim - touched on earlier. You've said that if you solve coupling and other problems, you might have to reconsider some things and you also made the comment if you saw more PVC's you'd be a little bit concerned. If you saw more PVC's in the day's run and it seems like one every six or seven beats is a lot, even over a minute period. That's 14 to 17 percent of the time, you got a problem. Would you recommend that Pete not be the man to go out and work on the wing, but maybe the guy that stayed back in the hatch because the workload would be lighter? You said you'd have to lighten the workload maybe.

HAWKINS Yeah, I think that that's what you would definitely caution him about and say look you know, if we see that you're encroaching upon these limits - 160 above heart rates we're going to slow you down. Now, we've not seen any of this below those heart rate levels and these were under stress. These were under maximum workload stress and I'm not sure that he would even approach this in the EVA activity. He shouldn't.

QUERY Well, that didn't quite hit on it. What I'm asking is okay, you slow him down if he happens to be the guy out there, but would you recommend beforehand if you saw the PVC's again today, that he not be the one to go out and pry on the strap.

HAWKINS If I saw nothing more than what we've seen then I would not hesitate to let him proceed. The only thing I said was that we might wind up placing some limits on the max workloads that we'd like to see him undertake.

PAO John Wilford.

QUERY How long was he on the ergometer, and what

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was his heart rate at the time that six or seven beats - one every six or seven beats out of what - 150, 160 or - -

HAWKINS He was kicking off at about 160, 64, 65 beats per minute at that range.

QUERY How long was he on the ergometer?

HAWKINS Well the steps are run 5-minute intervals - durations, at the lower level, middle level, and then the max level. Three levels of workload, so a total of 15 minutes. They move one - from one level into the next one and then you have a recovery period. And this was during the third level, and by the way, that was not run for a full 5 minutes, either. And Kerwin felt that prior to the run that he was going to limit that because of the fact they had been under the heat stress of the high elevations in the temperatures in the cabin and the other heavy activity that they had been under. So it was only run for 3 minutes.

QUERY Did Conrad say anything in the private conversation to indicate that he felt the heart skipping a beat or that he - what I'm getting at - is there anyway that Conrad - if he goes out on the EVA he would have some warning system in his heart to know that - golly I've gotten that same PVC, I'd better slow down - something to indicate that?

HAWKINS Well, no, he has not said that he felt anything and I honestly can't say whether he was - was - -

END OF TAPE

SL-II PC-26H/1
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HAWKINS - - has not said that he felt anything. And I honestly can't say whether he was subjectively aware of any of those or not. It's possible that he could be, and it's possible that he would not be, because as I said earlier, most people have experienced them, a lot of people have had them and never known it.

QUERY I wanted to see if I could understand the physiology correctly. Do both ventricles contract prematurely before they are filled completely with blood, the idea - -

HAWKINS It depends on where in the cycle that that impulse originates you see. Now these appeared low in the recovery phase, so that you would not consider this to be significant had it occurred back in the early recovery phases of the heart. Yes, yes. But you might have less filling than what you would under a normal system, that;s true.

QUERY And if it goes into a full arrhythmia what are the consequences?

HAWKINS Then you could have marked reduced output of your blood.

QUERY If I understood you correctly, you figure it's going to take about 8 hours to get this information back from the bicycle ride?

HAWKINS That's kind of my guess Jim. Now they are trying, they're pushing for 4 hours, but I believe we're a little bit over that right now.

QUERY Well, we're over 4 and the EVA is probably going to take couple of hours. How will you know what's going on with his heart rates?

HAWKINS Well, only when they're in station pass will we have that information. No, not except when we have them in station pass where we have real time data.

QUERY Well how will you - - you will have it real time?

HAWKINS Pardon.

QUERY In a station pass you'll have it real time.

HAWKINS Real time data, right sir.

QUERY So, most of the time it would be - you won't know what's going on?

HAWKINS It depends on how these, you know how the EVA is scheduled and what orbits we're working on. I don't have that information as yet, how that is set up.

PAO Any further questions?

SL-II PC-26H/2
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HAWKINS We should have, we should have fairly decent visibility I think. We will be full.

QUERY Yes, but if his heart rate starts going up to 160 rate you were talking about before, before LOS you would probably throw a caution on him before you went out of communication.

HAWKINS Yes, I think we would. We would give him some indication of what he is doing. It's a data feedback to the man, to assist him.

PAO Any further questions? No further questions. One further question from Mr. Malony.

QUERY Do you recall if Jim Irwin had these PVCs prior to his heart attack?

HAWKINS Jim, yes. We have seen PVCs in Jim prior to his mission. I've seen them personally in some of the chamber runs. These were always of a isolated nature. We've, as I say, we've seen them in other crewmen as well, he's not the only one. And it's just no, you know that uncommon. And it isn't that significant in itself, that you get, you know, you get that alarmed or worried about it.

QUERY Roughly how many astronauts have had these PVCs in the - -?

HAWKINS Oh, I don't, I don't have an offhand number.

QUERY - - total, in other words is it 75 percent of all those men?

HAWKINS Oh, I don't think that - - well I could say probably, we've probably seen it in at least 30 or 40 percent of them that we've observed. But, this doesn't say that they have had them at times when you weren't observing them either, see. That's the other thing.

PAO No other questions, we adjourn.

END OF TAPE

SL-II PC-261-1
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HAWKINS - as we were breaking up, Jack King just got a call and - from Mission Control Center over there - to tell us that they have got the data into the Center from Pete's M171 run, but it'll be probably a couple of hours before they get the thing run through the computer system and we get a look at it, but they think it's good, so we'll let you know what the results of that is.

QUERY You think the data's good, or the run was good?

SPEAKER That'll be the fastest you --

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 5, 1973
9:00 a.m. CDT

PARTICIPANTS

Charles R. Lewis, Flight Director
Jack Riley, PAO

SL-II PC-25A/1
Time: 09:11 CDT, 12:14:11 GMT
6/5/73

PAO Good morning. Again, this morning, we have Flight Director, Chuck Lewis, who will give us a summary of the vehicle status during the night, and then take your questions. Chuck.

LEWIS Okay. Start with temperatures. Seem to start with that most every time. There's been only a slight decrease in the temperatures since yesterday. The average gas temperature in the OWS 75.8, film temperature 79.7, and food 79 degrees. We had one anomaly or possible problem, last night, with RATE GYRO 3 in the Y-axis. We noticed when we have power on it and the wheel's inhibited, we had an oscillating output, off-scale 2 to 3 cycles per second. However, when we've got the power on and the wheel enabled, the output looks fine. So that's in work. And maybe more on that later today. In addition to that, what we did primarily on my shift was work in more detail on the Wednesday and Thrusday flight plans. Wednesday being the day prior to our planned EVA. Of course, Thursday, the EVA. About the only change there is that we moved the EVA simulation time for the crew up to the Wednesday morning, instead of the afternoon. That was done primarily to give us better network coverage. And, of course, the EVA on Thursday, if we decide to finally go Thrusday, we have 4 hours of prep time after the crew's eaten and then we start the EVA promptly, approximately 1600 Zulu, on Thursday. And that's basically the summary of the work last night.

PAO Arthur.

QUERY How about going through the way the EVA works, for us.

LEWIS Well. I can't do that, because they've got an off-console team working the actual procedures and time line. I can just give you, basically the blocks of time we allocate in the Flight Plan for the specific procedures and time line. Wednesday morning, basically, we've got 3 hours set aside for the crew to work with the procedural updates we're giving them checklist changes, probably some prep work, on special configuring for the SAS deploy. In the afternoon we've set aside an additional 1-1/2 hours for the crewman for EVA prep work. And then Thursday morning we'll probably wake the crew up about a half hour early, give them about an hour and a half for eating and personal hygiene. Then they'll start out a four hour preparation period before the 1600 GMT. We' based, you know, established about 4 hours on the EVA. That may be a little long, but we've given it that much time for the preliminary planning. And after that, they go on to a couple of hours of post EVA work. That puts them up to their presleep - normal presleep period.

QUERY Let me go through that again, 3 hours on EVA, 3 hours prep, 4 hours doing, 2 hours post, is that the way you've got it?

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LEWIS On the EVA day, it's 4 hours prep, the EVA, and 2 hours post EVA. And we've scheduled about 4 hours for the actual EVA, I don't think it'll take that long, but - And when we get the time line better defined, I think that's being worked again today, in a lot of detail, that could be decreased some.

QUERY Is there plans for TV during the SIMs?

LEWIS We do have it set up. We changed, like I said, to the morning so we would have good connaissance coverage. There may be an operational requirement for the TV. If there is, we'll be able to get some. And I say operational - if the crew - and we are discussing a particular problem, and that we think that visual aid would be beneficial, then we may schedule it so we can have the TV available to us.

QUERY The EVA time, starting at 1600 GMT on Thursday, that 4 hour timeblock, what kind of coverage have you got during that?

LEWIS First 2 hours, as our - just a minute I may have a time line, that I can look at. The first hour we're - we've got a good continental United States pass. And at about 1800 we have another limited continental pass. That's Goldstone and Texas. And after that, we're off the network. As a matter of fact, only thing we got left, we've got a part of a Goldstone pass.

QUERY I'd like to follow on that. And so, in other words, how much station coverage out of that 4 hours would you have timewise. You going to have less than an hour in that 4 hours?

LEWIS Let me just try to give you a rough idea. Probably on the order of little over an hour. If you count all the sites we've got within a 4-hour period. And like I said, I think, we have planned probably a little more time than will actually be required. And the biggest part of the coverage is in the first 2 hours.

QUERY What about day/night cycles? How much day/night?

LEWIS That'll carry us through - the 4 hours will carry us 2 - about 2-1/2 day/night cycles. But, I think, we're anticipating that the work we want to do will be accomplished probably in the first 2 hours.

QUERY Could you run through what this 4-hour prep consists of? Quickly.

LEWIS No, I really can't - -

QUERY On your - -

LEWIS Because I really haven't followed that work.

QUERY Okay. Would it include assembling the tools and all that stuff - -

SL-II PC-25A/3
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6/5/73

LEWIS Part of that and getting the suits prepared and actually doning the suits, checking pressure checks, pressure integrity checks. The communication checks, bioharness will be installed and checked. Those are some of the things I can think of right off.

QUERY Four hours of EVA is hatch-open, huh?

LEWIS Hatch opening approximately 1600.

QUERY Oh. Thank you.

LEWIS And there's a lot of gear to get moved around and stow and get into the right position, you know, before you start depressurizing.

QUERY Kinda the mundane up today, we're going to have an EREP pass today with all the cloud-cover, I understand - -

LEWIS Yes we are going to have the EREP pass today. The only thing I'm aware of as far as - of a change in changing the cloud cover is we've got more cloud cover now, 0.4 to 0.8 over the Houston area where we had several sites.

QUERY During the Wednesday simulation tomorrow will they be fully suited?

LEWIS I really, don't believe so. I think that'll be a shirt sleeve operation.

QUERY You don't know what revs it'll be on when they're doing the EVA, do you?

LEWIS It'll be revs, you want the number? Probably start on 346, 347, possibly 348. At 346, we're about half way through that particular rev. (Garble).

QUERY Perhaps you could show us - at least relative position of each crewman on the EVA, which way they move, a little bit of that?

LEWIS I'd hesitate to, because I'm not that familiar with it. However, I think we can get one of the EVA people over this evening.

PAO We're trying to set up an EVA briefing, Arthur, with someone who is familiar with it.

LEWIS One of the other flight control teams is doing the EVA work, and - - you going to get that today or tonight - -

PAO I don't know when we are going to get it. When ever the guys are available. Bruce.

QUERY I understood that the cloud cover was also pretty heavy at the beginning of the pass and all the way down through, is it not? Did I misunderstand that?

LEWIS As I recall it, we had 0 to 3/10ths for the first part of the data take and we got northwest of Houston and picked 4/10ths to 8/10ths. It's a funnel system apparently through this area and I'm not sure what it was past Houston, further you go.

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PAO I think the front's due through here late this afternoon, I think.

QUERY Whose the flight Director doing the EVA prep and will he take over during the actual EVA?

LEWIS Yes. It's Milt Windler.

QUERY What is the state of the batteries you have in the airlock, now? Are you still charging them? Are they still holding a charge?

LEWIS In the airlock module. We can only work with the four. That's battery 5, 6, 7, and 8. Battery 5 is 100 percent state of charge, and battery 7 is 100 percent state of charge. Battery 6 about 95 percent state of charge, and battery 8, approximately 50.

QUERY You can work with only 4, are you saying that the other 4 batteries were - normally be fed by the wing that isn't there anymore can't be used, if you get the other wing out, charge all the 8?

LEWIS No. I'm not saying that. I'm saying that with the partial deployed wing, the only output we're getting is out of PCG group 5 and 6. Now, we can switch the SAS 5 and 6 to these 4 batteries. In other words, we have the capability, in the way the system's built to switch the SAS output or a solar cell group output to two PCG groups. It's got it's normal path and it can be switched to another. I think it's just 2, and by using 5 and 6, we're able to swtich to 7 and 8. This is part of the redundancy in the system.

QUERY Then the other sections would feed into the other batteries, such that if you get the entire wing out, it will be charging into all 8 batteries?

LEWIS Yes.

QUERY Okay.

PAO Pete.

QUERY What's the status of the TACS fuel now?

LEWIS I believe we're at about 47 percent remaining, if I recall correctly, about 47 percent remaining. Still above our red lines.

QUERY Well a couple of questions; one relating to that. What would be the nominal at this time. Say, it had been a nominal mission? Do you recall what the figures should be at this time?

LEWIS No, I don't recall.

QUERY Okay. On those OWS batteries, then what is the status of the other 4?

LEWIS I don't know what the state of charge is on the other 4.

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6/5/73

SPEAKER (Garble) charged.

SPEAKER Is that it? You mean they're launched charged?

LEWIS But I assume that there was some power taken from them before we isolated the batteries.

PAO Go ahead. Berry, do you have a question?

QUERY I was just going to ask you about the way the parasol is working, it's still bringing the temperatures down, doesn't that - at least it surprises me after what you all said in the past, what's happening there, do you know?

LEWIS No, I don't know what you referring to - -

END OF TAPE

SL-II PC25B/1
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QUERY ...it's still bringing the temperatures down, and doesn't that apparently - at least it surprises me after what you all said in the past. What's happening there? Do you know?

SPEAKER I don't know what you are referring to. There's no change as far as I know. And the temperatures are still decreasing. The rate of decrease has certainly slowed down, but we're approaching, for example in the gas temperature, 75 degrees, which was what we were shooting for.

QUERY Well, I think what Art was referring to is we were - they were - a lot of hope at first that they were going to bring them right down to where they are supposed to be, around 70, and then they said, "Whoops. Wait a minute; we're not going to go below 80 probably." And now they're down to 76 something average gas, and you know - Why? Is it that your thermal models are no good? You don't know what you're doing from here, or what is it?

SPEAKER There's not many thermal models that are exact. They're only - we're only able to estimate. And - and I think they estimated 80 degrees earlier, and I think that's within reason. We're only talking 5 degrees difference as far as gas temp. Almost exactly 80 on the film and food right now. There's no model that's exact, particularly a thermal model. And as the crew commented several days ago, the water tanks were certainly - had picked up a lot of heat, and it - they were still discipating heat.

QUERY Okay. On another subject, what about the crew's suggestion that you eliminate their days off? Is this going to be done?

SPEAKER We've looked at that only briefly, and of course one of the days - one of the scheduled days off, we plan to have a - as I recall now, it was an entry sim scheduled. You know, walk through the entry procedures. But if there's no change, we may well follow up and schedule some experiment activity on the day off, or days off. I think we'd kind of watch that and keep it limited.

QUERY Has Pete had some extra M092 171 runs made in preparation for the EVA?

SPEAKER No, I don't think he'd had one until the one they scheduled this morning. And since he'll be the one on EVA, they wanted to get a run on him. I think they've got one scheduled tomorrow on Kerwin.

QUERY In consideration of Bill Schneider's statement this morning that the mission will not be extended (At least at this time they plan no extension whatsoever.), do you assess that - what - is it a correct assessment to -

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that the medical people have the greatest pull in deciding on the operations on this mission? And always the push-pull of flight planning - that they cared the greatest way?

SPEAKER Well, certainly I think that they would have a considerable amount of influence if they suspected any problems, as far as limiting the mission or limiting the work load of the crew. But at this point in time I don't think it's much more than any other discipline we've got besides disciplines ATM, EREP, and so forth. In other words, they're getting about their share of - of crew time that we'd planned premissio

QUERY To get back to the day-off things for just a moment, I'm wondering if, in your discussions of whether this is a satisfactory thing to do, you discussed philosophically and maybe medically too about whether the crew, even though they think they may not need some leisure time once in a while - whether you all consider this on the ground as well? And what your thinking of it was. Beyond just - You can do these number of limited experiments or something like that. I mean something beyond just the hardware, but the men involved too.

SPEAKER Well, based upon their performance today and the health - the status of the crew, we basically agreed that we could schedule activities on the crew day off. We could certainly change that if we have some change in status. And we're going to look - we're going to look at the type of experiments we'd want to give priority to during those days. Pete basically said - you know, ATM, EREP, or others. We'll look at that. I don't think we want to try to give them a full-up day on the day off, but we'll probably go through and analyze it and see what particular experiments we're behind on and - choose some.

SPEAKER I just caught up on some other shift-briefing commentary, and there was something in there the other day. A question from Mary (garble). She said wasn't it true that unless you got that solar wing deployed, that the last 8 days of the 28-day mission you'd be kind of coasting with just enough power to keep the spacecraft operational? Now that doesn't sound like what I'd heard before. It seemed to me like you had maybe 3 days before you might have a problem there. What's your assessment?

SPEAKER Let's see, I think we anticipate that we - we will deplete the cryo, cryogenics, on day 165. That's our estimate now. And, of course, that means we got to transfer power across to the CSM. And it would certainly curtail

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activities in the workshop ATM activities. I don't know how much. I think that that - After the EVA Thursday, if it's not successful, and we don't get the wing out, we'll certainly have to go back and analyze that very closely to see just exactly how much we can do after we've increased our baseline power requirement. We haven't looked at that in detail yet. But you're right. We'd have to transfer, as I recall, somewhere around 1000 to 1100 watts across to the CSM. And we're going to hold until after Thursdsy before we start that analysis. I don't want to do unnecessary work.

QUERY Is that 1000 watts constantly, at 24 hours?

SPEAKER Yes.

QUERY Yeah.

SPEAKER That's an average power.

QUERY If they deploy the SAS, there is no way, with that just on one side, it'll affect the stabilization of the vehicle, will it?

SPEAKER We'll make an update to the ATM digital computer to account for that so that the momentum management is maintained as it should be. We'll change the -

QUERY It's no problem.

SPEAKER No. It's no problem.

QUERY It's just an updating on it. And on the ground track for the EREP passes, how far is the spacecraft off the nominal ground track? Like when it comes over Houston with these various test sites, do you know how far it is off?

SPEAKER I saw that number, and I don't recall what it was. That was - No, but I can get that for you. I know - I've seen the number, but I don't recall what it is.

QUERY Is it very much, or --

SPEAKER No, it's not very much. But it's not exactly back on. It's not exactly over the ground track.

QUERY And - well, it - as it continues, will it continue to get further off? Or is it stabilized in a path now where from now on it will be going over the right track?

SPEAKER Well, it'll continue to get further off. That's why we have these trim burns. So that we can put the orbit back over and have the repeating ground tracks every - every 5 days.

QUERY As I understood it, you had the one trim burn, and there's no more anticipated.

SPEAKER Not for this flight. Not for this mission, SL-II.

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SPEAKER Okay, we have a question from a listener, Check. A listener writes in and wants to know whether the EVA positions have been identified by individuals yet.

SPEAKER I believe we're referring to Pete Conrad as EVA 1, and he's the man that goes out to the wing. Joe Kerwin, EVA 2 - he's the man that's in the hatch and assisting Conrad. And then Paul will be in the MDA, monitoring.

QUERY Has this been settled? Last night Mr. Schneider said that it was up to their choice.

SPEAKER It still is, but I think that's the way we're leaning on it. And I think the crew's probably leaning the same way. We haven't specifically said that or discussed it with the crew, but I think that both the crew and ground are assuming that. And it'll probably be discussed sometime today. We up-linked some of the procedures last night to them for their analysis. And they'll be commenting on those, I think, late today.

SPEAKER Pete, you have a question?

QUERY There was just one slight change there that maybe I just haven't caught up with. EVAs - sorry, not EVA 3. But the third man is in the MDA, because earlier it was suggested he might be in the CSM where he could get a good view of the activity.

SPEAKER No. As far as I know, he'll be in the MDA monitoring the systems.

QUERY Okay, thanks.

SPEAKER I don't believe - I don't believe he has a port that he can view through. We think that's the best place for him to be, there at the MDA, so he can monitor the systems that's supporting the two crewmen out - outside.

QUERY It's been normal EVA procedure.

SPEAKER Yeah.

QUERY Go ahead, Art.

QUERY This is a little confusing because Schneider yesterday indicated that the role of the third man would be to somehow watch the proceedings and relay the procedural steps to the two crewmen out there as they went through them.

SPEAKER He can certainly do that from the MDA station.

QUERY Even though he can't see them?

SPEAKER Yeah. I mean they're going to be on - assuming they're going to be on VOX and talking as they go through - you know, as they're have in the past, step by step. And he'll support them in any way he can as far as what procedure, what step's next. But I'm sure the crewmen outside will have cue cards and so forth with them also.

SPEAKER Okay, thank you. And we anticipate Dr. Hawkins in 25 minutes.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 4, 1973
7:12 p.m. CDT

Participants:

Bill Schneider, Skylab Program Director
Don Puddy, Flight Director
Dr. John Zeiglschmid, Skylab Flight Surgeon
John McLeaish, PAO

SL-II PC-24A/1
Time: 19:12 CDT
6/4/73

PAO Okay, we'd like to get started. One announcement I would like to make before we get started, we do plan a medical experiments status briefing tomorrow morning at 10:00. Let me identify our principals, all of whom I think you know. To my immediate right is Don Puddy, the Flight Director coming off shift, Surgeon - Doctor John Zeiglschmid, and Skylab Program Director Bill Schneider. I think everybody here has received Mr. Schneider's press annoucement from Marshall this afternoon. And we'll open at this time with an off-shift status from Don Puddy and a short statement from Dr. Zeiglschmid.

PUDDY Okay, well today was a very good day, very relaxed. Thermally, we were still running around 76 degrees. Fuel cell shutdown's still scheduled for day 165. We were able to maintain the batteries still above our red lines, all throughout the day with a heavy experiment load at around 70 percent state of charge, which is our desired level. We did accomplish an EREP pass today, number 4. It started northwest of Rapid City, South Dakota and ran all the way down to Puerto Rico. From all the data we've been able to attain so far, it was an excellant pass. We also had 5 hours of ATM viewing at another night side pass on the S183 experiment. And had an M092-M093 run on the Pilot. We did have one failure today that is not associated with the Skylab program directly, but as you know we do have 2 rocket launches that we use for calibration of some of the ATM experiments. Today we had what we call the HCO calrock. These rockets are launched from White Sands Black Brandt type sounding rocket. That particular vehicle was launched approximately noon today, and we haven't got all the data back from White Sands yet as to exactly what the problem was. But, it appeared that there was some sort of vehicle problem. And as a result of that, we went into an alternate viewing plan on the ATM, which we had detailed last night. In other words there is a certain program we use. If the calrock had operated properly to insure that we are looking at the same area of the Sun both with the calibration rocket and with the ATM instruments onboard in order to make sure that when we get the data back we've got an absolute calibration. It certainly is a desirable thing to have, but it is not going to be a degradation to the ATM experiment data that we are obtaining. What the recovery plans are, or whether or not they plan to launch another calrock right now is undetermined. As far as tomorrow is concerned, we do plan another EREP pass. Right now that EREP pass has 25 sites associated with it. It starts out in Nevada, goes down through

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New Mexico, goes over the HATS area, or the Houston Area Test Site, which is one that I'm sure you all have been briefed on in previous Earth resources briefings, very important to us, and then out into the Gulf. We also have about 3-1/2 hours of ATM viewing time scheduled. An M092, M171 run on the Commander, and an M131 run on the Science Pilot. Just to give you a little more advance, day after tomorrow we again have another EREP pass scheduled, that will be number 6. We have a MC92, M171 run onthe Science Pilot, we have a 3 hour block of time scheduled for the crew in preparation for the EVA which, as has been pointed out, you have already been briefed on. And we also have 4 ATM passes. So, in summary we're keeping up I think very well with what we predicted premission as far as the experiment protocol. We've had no new failures of any type today. The crew seems very relaxed. In fact, if you copied the air to ground that we had just a few moments before I arrived over here, the crew has requested that their 2 remaining days off, which are scheduled as day 15 and day 23 of the mission, be looked at by the ground from the standpoint of turning those from a crew day off into a day where they would like to go ahead and accomplish some additional experiments. They would like to take - the crew has expressed their desire to take a look at as much of the experiment hardware onboard as they possibly can. And we will begin an immediate investagation into that to see just exactly which experiments that haven't been looked at could be and still maintain a relaxed atmosphere for them. I think that's a fairly decent summary of where we are now and where we plan to go in the next couple of days. Let me turn it over to Dr. Z.

ZIEGLSCHMID Thank you Don. In the medical area, we are extremely pleased to be able to report that we've seen very little decrements in the experiments. The men are in excellent physical condition. The Commander and the SPT have only lost 1 pound of body weight to date, based on their inflight body mass measurement, which is subject to some inaccuracy. But, right now we've got 1 pound of loss on each of those men and about 4 pounds on the Pilot. Each man is consuming approximately 2500 calories per day. This intake has remained up in contrast to our Apollo experience where, as the mission wore on, the amount of food consumed sometimes dropped below that planned, and we had a larger weight loss than we have to date. So, we're quite optomistic that the food is tastier and better on Skylab and that the men will continue to eat the food and not lose as much body weight as - -

END OF TAPE

SL-II PC-24B/1
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ZIEGLSCHMID - the food is tastier and better on Skylab and the men will continue to eat the food and not lose as much body weight as heretofore seen in the Apollo program. There has been hardly any medications taken to date - just a little bit of Afrin for nasal stuffiness in the earlier days of the mission but nothing in the last three or four days. The crew are getting adequate rest. About six hours is all that appears to be required in this kind of environment under this workload and from all we can tell, all the data we can tell, the crew are in extremely excellent health through the 11th day now, and we anticipate this trend to continue. What kind of a readaptative process takes place after the flight of 28 days is hard to say. No-one knows that and that's why we're flying this mission particularly for medical point of view. I think - I don't have anything more to say and turn it over to Bill Schneider if he has statements to make.

PAO (Garble) but at this point we'll open it to questions. Please raise your hands, wait for the mike. Mark Cramer, CBS.

QUERY Bill can you outline in detail what the most likely and second most likely plans are for the EVA?

SCHNEIDER I think they've laid on a presentation too, by Rusty Schweickart later today, but to go into detail - - Is that right John? Let me just say that there are more people who are better qualified than I to explain the details to you, who I'm sure you'll hear from. What we will do in all probability, is and I would like to say, we're GO for EVA no sooner than Thursday. We do have a lot of activities that we have to go through up until then. We want to brief the crew and let the crew practice inside the workshop and get ourselves fully prepared. We don't think that that full preparedness can be any earlier than Thursday and it's conceivable that we may make a command decision to say it's not on Thursday if we don't think we're ready. However, what our plans are, are to have two crewmen and we will leave it up to the Commander to select which crewmen, to exit from the EVA hatch and to have five of the poles that they previously had onboard available to them with the bolt cutter on the end. One of the crewmen who I will call EV-2 would maneuver himself down on the fixed airlock shroud and position himself to where he could maneuver this 25-foot pole down along the side of the SAS. He would be joined by the crewman who we'll call EV-1 who will assist him then and they will attempt to grab a piece of the debris using the bolt cutters. The bolt cutters will at that time be merely used as a cinch to provide to - attempt to provide a handrail. Once they have

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secured that handrail, then EV-1 will progress down the handrail until he gets into the area of the debris, at which time he will connect a flexible tether to the vent module which are the modules on the side of the solar array boom that have been put on that in order to properly condition them on the Cape - at the Cape with dry nitrogen. I had previously reported to you that our plans had been to use what we'd call the BLAT, the big long adjustable tether. Activities yesterday led us to change that, we will not use that. We will use the Beta rope that we brought up on - for the standup EVA thermal shield, and we will attach that as I said to the boom and the other end up to the ATM truss. Then EV-1 will attempt to guide the clippers to cut the debris and if successful, why then that will be the debris cutting exercise. If that is not successful then he will attempt either to pry or to use the bone cutters probably and I - let me again state - we've done the best we could on the ground to figure out the way we think it is up there, but the two astronauts who are EVA are going to have a great deal of discretion as to what they think is the primary method, or just how they think they are going to go about the cutting of this debris. We can only tell you what we think the - way it appears on the ground to be. After the astronaut has severed the debris, he will then remove the pole that has been used as a handrail and then EV-1 will get onto the tether and lift the tether, which will have the effect of raising the boom and breaking the device that's been described to you as the clevis on the damper actuator, which should release the boom and allow it to be deployed into its full extended position, at which time we expect that the sails - the - this part of the wings of the solar array will deploy naturally. That could take up to 10 minutes for the wings to deploy and it is also conceivable that they may be frozen, although we don't think so. And if they are we may have to maneuver the vehicle in order to get some warmth in there to get them to deploy properly. Let me again say what I said yesterday. We have a lot of things that have to happen right, so don't expect instant success. We have to get out there and cut the debris. That debris has to be the only debris that's holding it, we then have to be able to haul the boom up into place. It has to lock, the wings have to deploy, and the glass still has to be on the wings, and the back - -

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SCHNEIDER - - we then have to be able to hold the boom up into place, it has to lock, the wings have to deploy and the glass still has to be on the wings, and the batteries still have to be in tact. We think all of that is possible right now, but that is a lot of ifs, and it is perfectly conceiveable that one of those ifs may not come to pass. So, we think we have a good chance of it, but it certainly not a 100 percent chance that we'll get good electrical power.

PAO I think the briefing that Mr. Schneider referred to is a briefing of the crew tonight by Rusty Schweickart from the Capcom console. And that's what is scheduled over the Guam pass at about 9:30.

SCHNEIDER That's correct.

QUERY Could you discuss with us how long it has taken to do this in the tank and what some of the dangers might be? How realistic is the possibility that some sharp metal might cut through the suit or a glove, that the wing the solar wing extending might hit the man, with what force can it come out and so forth?

SCHNEIDER Well, as best we can tell from analysis of all the TV pictures, and from crewmen's analysis, we don't believe there is any debris there - we have any debris in the way that will hurt him. He will be wearing abrasion gloves, which are designed for that purpose, to keep any abrasion down. We do - the suit does have a capability to withstand any puncture of a small nature. We do not anticipate that the crewman is going to touch any sharp metal. As a matter of fact, he will be enjoined not to do so. We think that's a perfectly acceptable exercise. We deliberately set up the exercise in the tank at Huntsville to have sharp edges at every point and we had them there. The suits showed no signs of abrasion, the gloves were worn throughout, and there did not seem to be any particular hazard. The crewmen don't try to put themselves in any dangerous situation. As far as how long it lasted, I believe from getting out of the hatch to getting into the hatch, it was something between an hour and a half and an hour and 45 minutes, during which time the crewmen did all 3 exercises. They clipped it, they pried it, and they cut it with the bone saw, and in addition, there was some operational delays while they adjusted the weight and balance of Ed Gibson. So, we think it is probably like one pass, but don't be surprised if it is longer. We may not have anticipated properly the magnitude of the job. It's also perfectly conceiveable that when Pete gets out there, he's liable

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to come back and say, well there's no way. You know that we are prepared for that as well, at which time we would hope that he would have a good description for us, such that on Skylab III we could go up and do whatever we could do. As far as the boom hitting them, the motion of the boom is expected to be about as rapid as the second hand on your watch. We don't anticipate there to be any problem of the astronaut being in the way. That's a very large structure, and we don't expect that he'll be able to get that moving very rapidly. It has been analyzed and there is no apparent damage - apparent danger in that at all.

QUERY Bill, could you just go through again the handrail aspect of it? I get the feel that you're going to use the poles with the belt cutter on the end to set up the handrail and then once you've set up that tether thing, that will be your handrail while you use the poles, and then you use the poles to cut it.

SCHNEIDER That's correct.

PAO Okay, Mark Blume, Kramer sorry.

QUERY He's in New York listening. Bill, the astronaut who is down near the wing will guide the bolt cutter and the other guy will actually pull the lanyard to cut the piece of metal, is that correct?

SCHNEIDER The first setting up of the - and let me again say our recommended procedure to the crewmen is going to be that the first setting up of the handrail be by the crewman back in the FAS, who we've designated EV2. They will both be in that position, they will attempt to grab the debris down there and provide this handrail. Then EV1 will move out there and using that as a handrail he then will get out of the way and if he sees that the cutters are not in the most optimum position, he will guide them into place and help the EV2 crewman. The EV2 crewman will be the man that will physically pull the, I'll say again how I think it will be, will physically pull the rope which will cut the debris, we hope.

PAO You have a following question Mark.

QUERY That tool is the one that was commercially bought, it looks like a tree pruning device. It is not the shears that made at Marshall.

SCHNEIDER Correct.

PAO John Pollick.

QUERY - - both from Mr. Schneider, from Rocco Petrone and from Kenneth Kleinknecht about the possibility of extending the mission if you doctors find that you have adaquate data to justify that extension. You had a pretty optimistic report on the crewmen a few moments

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ago in your statement I'm not asking you to announce your decision now, but how does it look?

SCHNEIDER Can I kind of answer that, instead? I - and he is perfectly free to speak after me, perfectly free to speak before me too - I expect that NASA will issue a statement on that, probably tomorrow. I'm not very optimistic that we will have found reasons for any - -

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SCHNEIDER - that probably tomorrow. I'm not very optimistic that we will have found reasons right now why we should extend the mission. We had very good reasons for picking the 28 days and while we'll continue to look at the data, I suppose it's perfectly conceivable that some time in the future we might change our minds. I think the probability that we'll go for a longer than a 28-day mission is very low at this point. Not because there's any crew degradation - I think as the doctor stated. The crew's in good health and all of the experiments have been coming along very nicely. However, we had set up a rationale on how we would look at that data and what kinds of things we needed in order to extend our duration and we have seen no evidence that we should change that rationale at this point. I'm a human and I reserve the right to change my mind later, but right now I think it's very highly unlikely that they'll be any mission extension.

PAO (Garble)

SCHNEIDER Did I say anything that you wouldn't have said?

ZIEGLSCHMID No, I just wanted to add to that that one of the important aspects here is to find out what happens postflight and there's no way to determine that imponderable without re-entry and subjecting the crew to the one-g re-adaptation process and we - at 28 days we were ready at double our previous Gemini experience. And while I think, personally, we could do it, I think it's more prudent to - and conservative and cautious to just go for the 28 days. That's my personal view and I think Bill kind of feels the same way, there.

SCHNEIDER Yes, except I didn't put the double lock on the door.

ZIEGLSCHMID (Laughter) Right.

QUERY If you have problems with this EVA and you don't solve the solar panel problems, do you have a capability on a second EVA or do you have to wait until Skylab 3 to go on?

SCHNEIDER Well, we have the capability - the physical capability unless Pete came up with some remarkable observation that would tell us how to go about it and correct whatever he could not correct. My feeling is we probably would plan for it on Skylab 3. We have started the development of some special tools like cutters and things of that nature that might be available for a later mission. We think we have a pretty good probability of doing it on this mission, this time and at this point I wouldn't know anything else to do other than to delay it and do it again -

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on Skylab 3. I would assume we would want to see some pictures and hear some descriptions of what any further debris might be that's holding down the arm before we attempted it again.

PAO Reg Terrell.

QUERY Until today, Dr. Schneider, there's been - the guidance has really been to whatever happens there will be some 56-day missions of some sort would be possible, but now your statement today rather changes this viewpoint - -

SCHNEIDER No - -

QUERY Will you tell us what's happened?

SCHNEIDER We've said that a 56-day mission would be kind of dull in the last few days and that's one of the reasons that I said that we changed the launch date on Skylab 3. We do have several other things that we are pursuing in the event that we cannot deploy the solar array. I think if you read my statement it says unless additional power is available why a 56-day mission may not be possible. We are looking at bringing up window shade solar arrays on Skylab 3. There was a meeting on those today which looks reasonable; it's not beyond comprehension that we could do that, although it certainly would not be an easy task. There is also - we're looking at bringing up two ATM solar arrays, as I described last night on the CSM on Skylab 4, which we would dock to the rescue hatch to bring up additional power. I think as I stated last night, without additional power on Skylab 3 and 4, when the CSM goes out of cryogenics it would be a very quiet mission and I'm not quite sure that I would be willing to say we'd go for 56 days without additional electrical power.

QUERY Two questions. First of all, will you be able to see the EVA on television and second is there time of day already set for the EVA?

SCHNIEDER First the answer to that is no. I've found no way to get any television camera, which would view this EVA, so we will not have any TV. As far as the second question goes, that's a detail which the flight planners have to work out and perhaps Don has some words on it. I don't know whether they've been able to find a good time. We do have some problem which he may want to comment on in that the good tracks are coming very early in the morning. Don?

PUDDY Well, let me just say that the planning that we've done so far is, we have scheduled into tomorrow's flight plan an hour or so of the time frame of where we will actually be looking at the procedures that we are going to uplink this evening. We are trying to pull together the detail procedures, put them in crew language. Rusty's briefing

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the crew tonight and coupled with those procedures which we hope to uplink, give the crew some time, about an hour's worth of time late in the day tomorrow, to go over those. We have also scheduled in the day after tomorrow about a three-hour simulation where they will actually begin to assemble some of the equipment - do what particular dry runs they can inside the spacecraft. And as far as the exact time of the EVA, no, that has not been picked yet. That will be looked at this evening and the optimum time will be picked - -

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PUDDY - - and as far as the exact time of the EVA, no, that has not been picked yet. That will be looked at this evening and the optimum time will be picked. But, to the best of my knowlege the statement that Mr. Schneider made is correct, that right now our preference is in the morning hours.

QUERY What time when you say morning hours?

PUDDY Well, I would say just a rough guess we're probably talking somewhere in the order of 8 to 9, 10:00 somewhere in there, local time here. It's all dependent on where exactly we've got the best site coverage and also in terms of sunrise sunset times, things of this nature. And that requires a detailed look.

QUERY Don, what is the status of the electrical power system today? And did I hear correctly that one of the CBRMs that was out came back on line?

PUDDY No, you did not hear correctly that one of them that was out came back on line. We still have number 3 and number 15 that are off line. The state of the electrical power system is very good. We've sustained loads as high as 4500 watts and been able to meet what we call our conservative line. We still could have gone a little further in depth to discharge on the ATM electrical power system and not expect it to run into any problems. As you have been briefed several times, we have what we consider to be a sound electrical management scheme whereby at the beginning of the crew day, we do power down certain equipments, and at the end of the crew day we bring those equipments back on line. This is done primarily to allow us to, excuse me, to allow us to accomplish the EREP passes which are very heavy power users. But the electrical power system today looked very good. And we've seen nothing to indicate that we're going to have any problems with the power system that we have right now. All we're trying to do is to augment it.

QUERY Dr. Schneider, you mentioned that you expect the EVA to take about an hour and a half to an hour and 45 minutes, that's what it took in the tank. Right?

SCHNEIDER That's what it took in the tank, but we're not expecting, we're not committing ourselves to any time. We'll give Pete all the time that he needs to do it.

QUERY Is there a maximum time, that you would allow? And are there any factors constraining the maximum time?

SCHNEIDER No, I think we'll leave that up to Pete's judgement. He's a pretty smooth and cool cat and

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he's not going to do anything that is unreasonable. If he gets out there and can't deploy it, well he's going to tell us so and come back in. So, I don't believe we'll put a maximum time on it. I would imagine that if he couldn't do that job in a couple of hours, he would probably say that's it I might add in regard to the CBRMs, we did say today that during this EVA we will ask the crewmen to do several other things. We will ask them to go out and observe the parasol and give us a visual observation. We will also ask them to go out there and pin open the S054 ATM door that has malfunctioned. And we'll probably ask them to see if he can tap the CBRM and see if he can get that relay unstuck. I guess it will give him satisfaction if he taps it and it doesn't work, it's kind of like kicking it.

PUDDY There is one other possible activity that has been discussed too, not to any great extent yet because we're still trying to pull together all the data. And that is the possibility while he is in the area and is pinning the S054 door, of looking at replacing the film magazine on S082A. These are normal activities that have been planned. There are no new procedures required. This is something that the crew has been trained to do before. And as far as , especially in the case of replacing an 82A film magazine is something that is scheduled to be done at the, was scheduled to be done on the nominal day 26 EVA. And our estimate of time there is approximately 1 rev to accomplish those two tasks.

QUERY Will you be able, will they be able to work during the time they are on the dark side of the Earth or will you use that maybe as a rest period or what?

SCHNEIDER Well, what we've decided to tell the crew is to start the activities during, just about twilight and to work up in the airlock area during the night pass, and to be positioned such that they can go out on the wing in the daylight. And we're also going to suggest to the crew that if they work into the next dark pass to go back to the lighted area in the workshop. We don't think we want them around any possible jagged edges in the night time.

PUDDY Let me add to that however, if we do decide to go ahead and accomplish the other tasks that we have mentioned as far as the ATM experiments are concerned there is no constraint there that I'm aware of unless you can correct me, that operation, that particular EVA transfer path and all the areas that I'm talking about are fully lighted. So there is no problem there. And they could accomplish that task during the night time

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frame with no problem whatsoever.

QUERY Bill, can you, I have 2 questions. First can you using the model indicate exactly where the astronauts would pause at the fixed airlock shroud and where they would connect the other end of the pole, that is, which ATM truss? The second question is do you expect television of the dry run inside the dome, and will they be suited?

SCHNEIDER I don't know whether or not they will be suited and I would assume we would try to use some television as a crew assist to get some discussion back and forth particularly if the crew runs into any problems I would assume they would try to use the TV camera to send the data back here so they could get a discussion back and forth. The path is for EV2 to come out to this area where the discone antenna is and to use that discone antenna as his, as his means of tethering and to attach the - attach the pole to the vehicle about at this point right in here. He is here and he will tether one end and he will attempt to go down and catch the debris at this end.

QUERY So the upper end does not get C clamped on to the truss?

SCHNEIDER No, it gets tethered on there, it will be tethered on there. The other astronaut will come down that path, work on this, come over fundamentally work from the top during the debris cutting exercise then come back to this position where he attempts to break loose the beam by pulling on a - -

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SCHNEIDER - the debris cutting exercise, then come back to this position where he attempts to break loose the beam by pulling on a strap. He stands under a strap and pulls up giving him a force up and down - the strap is attached back here and on the boom. When he stands up under it it's forcing up the short leg of a triangle, pushing - pulling a force upon the boom. We expect that that will happen in two steps. We expect that when you cut the debris, it will move out some angle to where the - it gets stopped by the damper actuator. We then have two edges of the clevis which must be broken and as the first one is broken it will move out a few more degrees and then as the second one is broken, move out a few more and then it - it hopefully then should come out to the full deployed position.

PAO John Pollard

QUERY A couple for Mr. Schneider. Will the crew attempt to straighten the parasol to get better coverage of the workshop area and bring the temperatures down?

SCHNEIDER We don't have any plans for that at this time. No. We expect that they'll tell us what it looks like but it seems to be working pretty good. I don't think we want to fuss with a good thing right now.

QUERY To relate a question for the doctor. Can you talk a little bit about the results from the bicycle and the straps? They commented today that it's a lot easier without the straps. Are they actually doing a lot of that work with their hands that's not getting measured in some way, and how satisfactory is that experiment turning out?

ZIEGLSCHMID Well, we just heard the discussion that you did today that Joe Kerwin and Pete - trying the system out for the first time in long periods of zero-g, found that the restraint system really was a more of a hindrance than a help. Originally the concept was to tie them down into the bicycle seat so they would be held secure and would be able to pedal. They've found that the lap belt particularly seemed to interfere with the circulation of the lower legs and the shoulder straps tended to interfere with respiration so they, being inventive, tried the system without the straps and found that they were able to, by holding onto the handlebars, actually more nearly approach the way the system was designed to operate in one-g, than with the restrain system, so they came down with a recommendation to do this. We made a little test this afternoon to find the effect of this setup on the VCG and the blood pressure system and found both were not effected appreciably and we therefore did recommend that they go ahead and do all future runs with - in the unconstrained - unrestrained condition.

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So, this is what we're planning to do and it seems to be working real well.

PAO Pete Baldwin.. Now let's take this and about two more questions and close it.

QUERY Bill, I'd like to clarify a point you made earlier when you said something about turning the vehicle to warm up the section. I thought you said the other night if you turned the vehicle you would lose all power and everything else?

SCHNEIDER We obviously, if we get back into the situation that we were in the unmanned period that's correct. What the point is if the beam - if the wings are stuck in the UP position, what we would want to do is get a little sunlight on this surface here. So you would be talking about a small PITCH-UP maneuver. Now, that would have an effect on the electrical system and it would have an effect on the thermal system, and we would have to evaluate that before we made the maneuver. But we're not talking about the radical kinds of things that poor Don Puddy and his cohorts had to put up with in that harrowing first 10 days.

QUERY This would be after the deployment of the wing?

SPEAKER Yes.

SCHNEIDER We think they're going to deploy. The temperatures there are about - on the worse case, are about minus 34. I think that's right, Don isn't it? Minus 34 and these things have been tested and deployed at minus 40, so we think that they'll deploy all right. But there's always a possibility that they won't and if they don't, why, they'll have to do something like getting a little sunlight on them.

PAO Mark Cramer.

QUERY If they don't deploy is there anything that EV-1 or EV-2 can do?

SCHNEIDER We have planned nothing. I think you'll find a program director that cries a lot. It's - no I - seriously, I've conditioned myself to - -

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SCHNEIDER - think you'll find a program director that cries a lot. It's perfectly - no - I - seriously I've conditioned myself to where I'm optimistic but not overly optimistic - there's - it's a perfectly possible thing that when we open those up we find that we've got broken glass or that some debris in there has damaged that glass or that for some reason or other they're not putting out the full power. Now, if they do deploy, the estimate is that we'll get about three KW out of them and currently we're running about 3.9, so you can see how that relieves Don's very critical problem of electrical management. So, even a reasonable percentage of that 3 KW will go a long ways towards helping us out. Now, we do know that we're getting some electricity from that one panel on the far side which has partially deployed, so we know that the glass is there now. Obviously, it's perfectly possible that when we deploy it why that has some deleterious effect to that panel, so what does happen we really can't tell. We're hopeful at this point.

PUDDY As a matter of fact I might add to that one that as of today on one of the batteries we have raised the state of charge on that particular AM battery to 100 percent. We have another one up to 96 percent and expect by this time tomorrow to have it up close to 100 percent. So, we do know that we do have some electrical power generation capability with the wing in its present position and we are hopeful that it's going to stay that way and be even greatly improved.

PAO Let's take our final question from the Huntsville Times.

QUERY Just curious as to what the third crewmen will be doing when you've got the other two outside, Bill?

SCHNEIDER Well, just like all EVA's the third crewman will be up on the other side of the airlock, up in the command module side of the MDA, and he will be reading the procedures to the other two crewmen so that they have a verbal description at all times as to exactly what they're supposed to be doing.

PAO Thank you very much ladies and gentlemen.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 4, 1973
9:45 a.m. CDT

PARTICIPANTS

Charles R. Lewis, Flight Director
Jack Riley, PAO

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PAO The Change of Shift Press Conference, with Flight Director, Chuck Lewis, will begin momentarily in the Houston News Room. We'll take down the air-ground circuit at this time and tape for delayed playback the Canary Island and Ascension passes of the Skylab space station.

LEWIS Morning.

PAO Flight Director, Chuck Lewis, is here today to summarize the overnight activities, status of the vehicle, answer questions. You want to start with your summary, Chuck.

LEWIS Okay. Regard to temperatures, it looks like the average gas temp in the OWS is down to about 76-1/2. That's about a little over a degree less than it was yesterday. The food and film vault appears to have dropped another degree or two. We're at about 80 degrees there now. No other changes in the temperature. In temperatures the electrical power system, basically no change. We evaluated the power requirements for today's Flight Plan, it's GO. We've got EREP pass 4 scheduled for today, uh, of course the ATM operations and we will be launching a rocket from White Sands for calibration purposes associated with the S055 experiment. And the last I heard they were GO at White Sands. Last night, we - we were planning day 156. We have EREP pass number 5 planned there. Nothing else. Well, I take that back. We did go ahead and baseline an M092/171 run on the commander, in preparation for the, - for an EVA which is the change we made last night. And we scheduled a little bit of time in the afternoon for presleep, for any comments crew may have on the EVA procedures that we'll uplink some time later. I haven't seen the procedures. I don't think they have all been developed; they're in work. I'm not sure you're aware we had a problem yesterday with the S183 experiment. The slide - the film slide carrousel jammed. We lost two 183 passes; we had three scheduled. We lost two of those. One of those was used for malfunction procedure on the S183. They removed the carrousel, and found the slide that had jammed it. But they've elected, for the 183 pass today, to go with the DAC camera only. And they've arrange their pointing for S183 such that the DAC film will be - It is sensitive to UV. So it will be good data. That's basically - basically it. Questions.

QUERY Chuck, a couple of things, first of all, I understand that there - what we've been hearing about the four batteries that are only getting a state of charge of about half power, are those the same four that bounced out on, after the first EREP pass?

LEWIS Well, either you may be a little confused or I am. We are trickle charging some of the batteries in the OWS with the partial wing deploy. Batteries 5, 6, 7, and 8. Last night we did get battery 7 with a 100-percent

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state of charge. Now, we're not using those batteries. We've been days with this very limited power output from the partially deployed wing charging those. We've got one of them fully charged. We've got battery 6 about 72 percent state of charge and we initiated charging on battery 8 this morning. Now there is no change in the CBRM status in the ATM power groups. Did I answer you?

QUERY Now I'm more confused than ever. We're talking about OWS batteries in these - than these four that have been only about half power, you've been bringing them up, is that?

LEWIS No, you may be referring also - The ones I referred to were the batteries in the OWS called the PCG groups, which we're not using now. When we did lose the - when we did lose the CBRM 3 the other day at the end of the EREP pass, we did go back and do some studies and look at the amp- hour capacity of the batteries. And I recall the two that indicated only about 12 amp-hours, and one I think around 9 or 10 amp-hours when they should have been up around 20 to 24 amp-hours. I really don't have any further status on that, except that to say that we are - we were flight planning, we're protecting the depth of discharge on all those batteries, because they did catch us by surprise. So we don't get to a point where we have a battery disconnect and possible lose another CBRM. That's one - that's why we do these Summary Flight Plans. We go back and the power people run a detailed analysis on the entire flight planning activity. Either give us a GO, or tell us where we're in trouble and we either eliminate an activity or we think of other powerdowns we can do during that time period, that you know, keep the power load below the critical limit.

QUERY From the way you're talking about the EVA, I assume that your philosophy is to proceed as if you are going to do the EVA on Wednesday and if management changes its mind, then you'll change yours, or if management decides differently, then you'll change your procedures?

LEWIS That's correct. There's a meeting this morning, as I understand it, around 10 o'clock to make the decision on the EVA. Now since we have to plan ahead, we did plan ahead a couple of days for the EVA activity, and we baselined it in, preliminarily, on day - Thursday. And we baselined in some crew procedural work, walkthrough, some training simulation on board. We gave the crew some time for that on Wednesday afternoon. But like I said, that's very preliminary, the flight management personnel, depending upon the outcome of the meeting later today could well change that. But that's the preliminary plan right now, as far as what we did last night.

SL-II PC23A/3
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QUERY If you don't know the procedure exactly, how can you time line it very well? What do you do about that?

LEWIS We didn't time line. All we did was allocate blocks of time. We may have - we may be short; we may have a little too much, but we had to just baseline some block time. That's what we've done, very, very preliminary.

QUERY Okay, and on the batteries, now, on charging the OWS batteries. Is there any way to tell if those batteries are okay, considering what they - the dormant state they have had to be in for this amount of time. Can you tell me anything about the - about the health of those batteries from what you've been doing so far?

LEWIS I've heard nothing, or seen anything to indicate we would have any problem with them, if we get a wing out. As far as I know, they're in good shape.

QUERY Couple of questions on the temperatures. How much further do you think they're likely to come down?

LEWIS Well, if you've been tracking the temperatures, a very, very slow decrease now, and it may be reaching a point of stablization. I don't know. It's - I think they anticipated somewhere around 75 degrees, but we may, I can't say, we may or may not reach 75 degrees. Now the wardroom temperature last night, we're reading about 73. But you've got to look at the overall gas temperature, which I gave you early, was 76-1/2. We'll have to wait and see if we're going to get much cooler.

QUERY Have you tried moving the parasol. In the beginning, the idea was to revolve it, wasn't there, to vary the temperature a bit?

LEWIS The idea at the beginning was to have the capability of modulating or revolving the parasol, but we've got it positioned now for max cooling, obviously, until we get our temperatures down. And I don't suspect that we'll be changing it. But that could happen.

QUERY Couple of questions. On the - on this preliminary look at the EVA and the rough time blocks that you've laid out, what time blocks have you laid out for an EVA start? Will it be in the morning after crew awake. Is that the kind of thing you look at; or do you prefer to do it then when they're say at their freshest?

LEWIS Okay, I said we'd kind of baseline day 158, or Thursday, for the EVA. Now we didn't address the actual plan for that day, what we did was base - -

END OF TAPE

SL-II PC23B/1
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SPEAKER Okay, I said we kind of baseline in day 158 or Thursday for the EVA. Now we didn't address the actual plan for that day. What we did was baseline that day so we could look at 157 and 156 for it's preparation. We did not baseline either the morning or the afternoon of Thursday. However, looking at network coverage and so forth, it may be preferable to go in the morning. Because in the afternoon, as you are probably aware our orbit's moving off the continental United States and in the afternoon we have very limited site coverage. But that certainly will be decided later.

QUERY What does your power budget look like today and watts? What is around 4500 or 4600?

SPEAKER I don't have the number with me, but I would guess it's up around 41, 42 hundred; in that range.

QUERY Would that be a short EREP, so called short EREP?

SPEAKER We're taking a limited EREP data take time; 12 minutes. That's the reason it's limited is power considerations.

QUERY Chuck, seems like everyday, at least once a day, I keep hearing more about the Y-rate gyro - Y axis rate gyro. Are we still having problems with that, and why?

SPEAKER As you're probably aware, we've had these so-called redundancy management failures on the gyro since the launch of the workshop. And we still don't know why we're having the problem. We're updating the drift compensation for the gyros. So we're really not sure what's causing the problem now. That's happening in all axis. We've seen it, as a matter of fact, in the last two days we had one redundancy management failure in the Z-axis. We had one in the Y-axis - Y-axis. And I don't think we really have a good handle on why that's happening to us.

QUERY What effect does it - does losing the - and having the management problem, what effect does that have on the flight?

SPEAKER What can happen to you is if you inititate a maneuver and you have the RM fail, then in some cases you can fire TACS. You can saturate a CMG and fire TACS. We would like to advoid firing the TACS. It's not a big impact. It impacts our TACS fuel and, of course, we're down considerably on it. It can be worked around. We've worked around it repeately. Of course, we'd like to eliminate it. Is there any - does that basically answer your question?

QUERY Have you got any body weights of each crewman? They've been weighed everyday, I understand.

SL-II PC23B/2
Time: 09:02 CDT
6/4/73

But we've never been able to get a figure on how much they weigh now compared to how they weighed when they went into orbit.

SPEAKER No, I don't have any as - You got any information, Jack?

SPEAKER I really don't know.

SPEAKER No. We'll have to try get something from the medics.

SPEAKER We'll get a surgeon over one time and brief you on what they've seen. I really don't know.

QUERY - inputs on the medical people on the results of all these tests they've been going through. Everybody's been saying, gee we're acomplishing all these protocols, you know, doing all these things. And we've gotten very little word on what - what the heck it's all about.

SPEAKER I think we can probably get a surgeon over maybe in the moring or this evening. I don't know. Work through Jack. I think they'd be glad to come over.

QUERY As I understand it the way the medical people plan, that they get down the raw data each day but they don't - they're not able to evaluate everything based on that. They're having reviews about once a week of the data. And, it's been my understanding that they have agreed that they will - following each of these reviews they will come over and present the information that they do have to you.

SPEAKER Let me -

SPEAKER We'll check with - No it hasn't. You've had briefings by Dr. Hawkins later than 11 days ago, Arthur. And we'll check with Dr. Hawkins today and see when he thinks he can do a briefing.

SPEAKER Let me say this,

SPEAKER - -fine and you know, they seem to be looking good and all that sort of stuff.

SPEAKER I think that's basically true, and let me say this: With regard to the medical data processing, I know they been having trouble there getting all the data. I know they're still looking for some early data from either the Site, or it's here in the building and - they havn't located it. But, I would think they're beginning to get in pretty good shape with their data.

QUERY I guess what I was asking really is just some basic stuff like; how much do they weigh now, how much did they weigh last week? And before they launched what is their blood pressure? What does their blood count look like? Does it look pretty normal to the doctors now? You know, just some pretty - questions that ought to be -

should be answerable now I would think, without going into a lot of medical analysis.

SPEAKER Well, for instance, on the weights they have to take the numbers they get. They don't read off direct weight. They take the nunbers they get, and I understand it, calibrate it by some scale before they come up with the weight. They've got to strip out this data before can - you can't just call up and say what do you weight now and get an answer. Is that right? They calibrate it in some way.

SPEAKER I know they're still after some of the early calibration data. And if he wants the flight plans, as a matter of fact, I've got one in here for 156 M171 cal data, which was apparently lost back in the data processing earlier. But I would think the surgeons are probably in a reasonable shape and they could give you a general rundown of the crew. If you look at their workload, there can't be too much wrong with them, because we're really piling the work onto them. So if there was something wrong I think it would be reflected in their workload, and it sure hasn't been.

QUERY Chuck, you mentioned the calibration that are lost. How much data have you'll had problems in losing. Channel B, from what we've seen of the edited and unedited has got more blanks in it than, I don't know. Why it's got all the blanks if that's a drop in comm or what? And how many problems have you had in reacquiring all this dump data that you're getting?

SPEAKER I think basically at this point and time we're in reasonable shape. The first few days we were probably behind 2 or 3 days. Now that's getting the data in the building. All of it. Now, with regard to medical for example, they have to get it in the building. Then it goes on to special processing to get their data out. Just like Jack said the weight and so fourth. They have to compare it against calibration data to get - get the real numbers. Channel B; one of the reasons you see the blanks I think in a lot of cases the people that are doing the transcribing on the initial transcripts aren't that technically oriented. I've had controllers at positions ask me to ask the crew again for this information because the transcript had blanks in. And I said go back and listen to the tape. Sure enough we go back and listen to the tape and they can make out what they are saying and has some meaning to them. But it doesn't have that meaning to the people transcribing the tapes. Now I understand that's being worked on. Now and also after that, there's a second release a couple of days later. Usually I think it - most of those blanks you see are filled in. We have lost some data - just didn't come through on the recorder. Background music, you may have caught the other day, we advised the crew, I don't know, several days ago that sometimes the background music was so high it drownded out the - their data recording on Channel B. But that's been squared away, I believe.

QUERY I got a couple more questions on this power management. The other day, I remember there was some comment, I think you were running oh, somewhere around 46 - you had budgeted somewhere around 4600, 4700 watts. And then you went to a powerdown configuration. You'd figure it would drop off by about 300, instead it went off by about 600. And you went back to the crew and asked them how, you know, what might have happened. They said, well, we were turning off some lights here, and it looked like that acounted for the missing 300. Does that mean that you don't have good telemetry indication of what your power usage is during these operations?

SPEAKER No.

QUERY Kind of rely on talking to people and finding out what they're doing.

SPEAKER Well, obviously, we don't know what lights they've go on unless they tell us. And that could be true also of some of the duct fans. Now, we - we provide the crew with baseline lighting and fan configuration, but we're not there to see how much lighting they really need. And I know the crew has made every effort to keep the lighting to a minimum. The crew has commented on that. It could be that the lighting was the difference between the 3 and 600 numbers. I remember the question. They couldn't think of anything specifically, except that they had kept the lighting to a minimum. I think we've got a very good handle on the power, what each subsystem consumes. There are just a few varables that we got to ask the crew about to see exactly what the power level should be.

QUERY So basically what you're running it on is a Flight Plan budget where you know what the operations are going to consist of. You have - you have a base - base - baseline for the basic OWS operational requirements, such as lighting and all these other things. And then you know you're going to have EREP passes, and ATM work and all that. For each one of those you know what the power consumption is going to be. So at those times you have a hack then based on that what the power consumption at that particular time is. You're not getting TM read outs then at those times - -

SL-II MC-23B/5
Time: 09:02 CDT
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LEWIS No. We're having to project ahead on these on the power profile, which means we're not using telemetry. And you're right. We've established a baseline power requirement and depending upon what experiments may be running, we Delta above that. Or what experiments may be running simultaneously, it may mean more than that running. Now that's done by a computer program we have. The Flight Plan input into the computer program with these various activities, ATM activity, the medical runs, or whatever. And it runs a power profile for us. And we're looking more at depth of discharge, maintaining a limited depth of discharge in the battery, I think, now more than we are peak loading. We see that we're going to possibly go below, I think it's about 30 percent depth of discharge, then we either come up with some items we can power down during that period, to keep us below the limit or we'll have to cut an activity out.

QUERY On the average, what is your baseline in workshop operations power requirement? Without experiments?

LEWIS I'm trying to remember. I think it's around 3600 watts, 36 or 37 hundred.

QUERY As I understand it, you've got about 46 percent of your TACS gas left and you should have about 90 percent, had you not had the problems the first 10 days. Do you have enough to last the next 130 days or so, that you have to - for the maneuvering you'll have to do?

LEWIS We're still about 15 percent above the experiment redline. We can do all the experiments that we've planned. And - there was another number. I forget what it was. We're not hurting on TACS. If we can conserve, you know, and not have maneuvers or problems such that we'd spend a lot of TACS.

QUERY In the event that deployment of the wing or getting the electricity do you think you're going to get - by the deployment of the wing, - doesn't work and some kind of a scheme to put in the rescue party - an ASTP docking module with wings on it, or a parasol solar array program of some sort, are you going to have to do a lot more maneuvering of the ship? It won't require any more adjustments in orbit for those kind of things?

LEWIS I'm not aware of any proposal to put an ASTP-type docking module in the radial port. That one's beyond me.

SPEAKER That's one of the conceptual things that Bill Schneider talked about yesterday.

LEWIS Okay. Yeah.

QUERY If this doesn't work, - if the EVA doesn't work, you don't get the power you want. Those are, I guess, far off backup ideas?

SL-II PC-23B/6
Time: 09:02 CDT
6/4/73

LEWIS I really don't know what the imapct that would be. I haven't given any thought to it. I really haven't heard anything about it.

PAO Okay. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 3, 1973
6:53 p. m. CDT

PARTICIPANTS

Don Puddy, Flight Director
David Garrett, Public Affairs Officer

PC-22

SL-II PC-22A/1
Time: 18:53 CDT
6/3/73

PAO We have with us tonight Donald R. Puddy, Flight Director who will take questions for 10 minutes. First question.

QUERY I heard today that tomorrow might be the last time for operating the S-183 experiment.

PUDDY I think that's basically true. We've operated SO-19 and S-183 more or less in the anti soler SAL and of course we would also like to install the Earth terrain camera. in that SAL, so right now, at least for the forseeable future, it is our last planned operation of S-183.

PAO Next question.

QUERY Can you give us the state of the batteries, the temperatures and explain the CSM pressure problem today?

PUDDY The CSM pressure problem that you heard about was the SPS oxidizer and basically it wasn't a problem. What we've been seeing there is a - over a number of days - and let me see if I can remember the exact figures - I believe we start out 174 psi somewhere around 74, 75 degrees and we have shown a gradual decrease over a period of time until today where we had around 162 psi at 44 degrees. It's no real problem, it's just the fact that the spacecraft is gradually cooling down. It did get to the point however, where it was right at the point of tripping the crew's caution and warning and once we explained to them that is was strictly a pressure temperature relationship there's - everybody was relieved and that was the end of that one. As far as the batteries are concerned. We were again able to maintain a complete re-charge of all the batteries at each - at the end of each day's cycle. And had no electrical anamalies or problems of any kind.

QUERY But your's was the third part.

PUDDY The thermal condition of the spacecraft? Oh, we're still dropping. When I left this evening, or at least when I got my last briefing on the subject we were at 77-1/2, still going down and last night I believe I reported to you it was 78-1/2.

QUERY I've got more, but I want to give somebody else a chance - -

PAO Let's go to Reggie.

QUERY Could you possibly give us a very brief summary of the day's achievements so far as experiments were concerned?

PUDDY Well, let me see here. Of course the big - one of the big achievements was the fact that we did have our third EREP data tape. That pass went very well. Again we had excellent weather conditions and we accomplished all of our objectives on that. We had a M092,M093 run that went very well. We had - by the time we finish up tonight

SL-II PC-22A/2
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we will have had five ATM passes. I think the total time on that is going to be about 4-1/2 hours total solar viewing time. We did have an S-183 operation and if you did catch the air-to-ground, we did have a problem today with S-183. One of the film plates actually stuck and we have run a malfunction procedure on that and we have got the instrument capablr of being used tomorrow and it is scheduled for a early pass tomorrow morning. Exactly what happened to the data today, I can't really say, whether or nor some of that data today, due to the malfunction procedure and the way we had to fix it was hurt or not, I really can't say. That's the highlights I think as far as the experiments that were conducted today. It was a full experiment day.

QUERY Is that four and one half hours today looking at the Sun?

PUDDY Yes, that's correct.

QUERY I take it no alarms with the - or no problems with the batteries during the EREP pass and are you now at a reasonable state of confidence that - with the shortened EREP's you can carry on more or less indefinitely at this sort of level?

PUDDY Yes, as a matter of fact, tomorrow we're lengthening it a little bit.

QUERY Can you tell me what the specific targets will be tomorrow?

PUDDY I have not had a chance to go over all of the targets. Actually that particular detailed information is done on the shift that just came on duty. As far as detailing exactly what targets are going to be looked at and what instruments are going to be used to look at those targets. I can tell you that we're looking at a data tape that looks like it starts at 17:04 - -

END OF TAPE

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PUDDY I can tell you that we are looking at a data take that looks like it starts at 17:04 and runs through 17:16. It's what we call track 19, and I'm sure you can pick that out on the map you have outside.

QUERY Pete said the parasol was turning in color. Does that mean it maybe degrading? And also what is the amount of TACS gas you have remaining?

PUDDY I did not look at the exact budget when I left there this evening, but it would have to be in the, I would say in the 46 percent remaining. I'd have to check that exact figure. It might be 45, but it is right around 45, 46 percent. We have not used any significant TACS since the docking. We have had a couple, we used a little bit during one of the EREP passes. We have slowed down the maneuver time into ZLV both going from solar inertial to ZLV and from ZLV back out to solar inertial, such that we do not expect to get any TACS firing during that. In fact tomorrow's budget is no TACS usage whatsoever for those particular maneuvers. We have changed our management plan a little bit as far as the number of consecutive momentum inhibits that we have to minimize momentum build up. We have accomplished a test with a Y axis maneuver that we did on day 9 to determine whether or not we had a scale factor error in the Y axis rate gyros. And we had determined that in one of those gyros, we do have an error. And as soon as possible, we are going to go ahead and update that gyro and that will further decrease any possibility of getting into TACS usage. So, basically I think we're down to the point now where we can manage the system with only very minimal usage and we can make the TACs experiment worth trade off.

QUERY You are at 46 percent now. Where should you be had you not had all the anomalies that we have had? And also I ask you about the parasol turning color. It's probably almost an impossible question to answer. Do you have any kind of input into that at all though?

PUDDY Well, I think any time you put a coating or material like that out, we do expect some discoloration from the Sun. As far as the information that we got back tonight from the crew in response to our question, there certainly isn't anything we glean from that that indicated that the parasol is degrading or is not doing its job. Certainly by the thermal measurements that we're taking right now, we can confirm that. We're still coming down. We're still exercizing coolant loop management from a power conservation stand point with no increase in temperature. So if the parasol was not doing its job at this point in time, we would certainly

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be able to detect it. We are not worried about it.

QUERY Can you give us a run down on all the experiments that are not functioning properly? Can you give us a brief list?

PUDDY Let's see, that would take about 10 minutes by itself. We have had, in the ATM area, we have had the S054 door stuck in some sort of intermediate position. Exactly where it was, we are not exactly sure. We have, were able to free that door by the use - we have 2 motors that we can use if require, a primary and a secondary motor. We have gone ahead and opened that door back up, and are leaving it open. And we have not experienced any problems as far as the S054 experiment itself is concerned, except that one time frame when the door was at an intermediate position during one data take. We had the S183 problem that I mentioned a minute ago. We had an S019 problem that I think you've already been briefed on. We have had what I would like to call some funnies, with some of the EREP experiments. To the best of my knowlege however, right now - we were kind of penalized in the EREP area from the stand point that we do not have the telemetry data like we have on a lot of the experiments, to give a positive assessment of those particular experiments and must rely very heavily on voice crew reports in real time as to what those instruments are doing. We are very concerned on S192, which is one of the high priority EREP experiments in that we are not sure that we have a good visible spectrum alignment. And one of the adjustments that we have just made to tomorrow's flight plan is the first part of the day prior to EREP number 4, we are running a thorough alignment check on that particular instrument in order to get - -

END OF TAPE

SL-II PC-22C/1
Time: 18:53 CDT
6/3/73

PUDDY - EREP number four. We are running a thorough alignment check on that particular instrument in order to gather that. We have had some set-reset problems with S00-9. As far as whether or not we have completely cleared that one up, I'm not positive, we're still monitoring it. The M-4873 Alpha experiment we briefed you on the other evening we had a problem there with the audiometer. That one has been cleared up and that instrument seems to be performing very well. We had a problem with the CO2 monitoring instrument where we lost one of the sensors and that. And I'm sure there's probably a couple of others, but right now my memory is escaping me.

PAO We've gone over our time. We have one question from the Cape I'd like to give Don a chance to look over and perhaps we can get an answer to it.

PUDDY Okay, I guess this question is essentially what is our experiment capability during the last eight days in the event that we cannot deploy the other wing or deploy the AM wing that we talked about several times previously? I think that my answer to that question is going to be that you certainly are not going to be able to run the very high-power-requiring experiments. In other words, I do not believe that it would be possible for us to run an EREP pass. However, there are certainly numerous experiments which have tremendous scientific value which are low power users and which by power management I feel fairly certain that we will be able to schedule. And we are planning an experiment protocol throughout the entire 28-day mission. We have also managed to extend to a certain extent the amount of time that the CSM is going to be able to provide its own quiescent loads. I think a couple of days ago we reported to you that this figure was around day 165. We're now hopefully looking at day 166 and as time goes on that figure may change, although I don't expect that we are going to be able to better that by very much.

PAO One more, and then we'll close it out.

QUERY How would the ASTP docking mechanism be placed in the radial port of the multiple docking adapter if it were used?

PUDDY Well, let me say in answer to that question. Why would we want to do that?

PUDDY I'll turn that around --

PAO Bill Schneider mentioned that this afternoon at a briefing we had perhaps you're not really the one to answer it.

PUDDY I think probably that I'm not the one to answer that question. I do know that there are several things being evaluated from the standpoint of possible solutions

SL-II PC-22C/2
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in the event that an EVA to free the OWS wing does not appear safe, prudent, or profitable, as far as gaining the capability for some extra power. All of those investigations have not been completed. There is a management meeting on Monday at Marshall where they're going to go over the various investigations that have been looked into as far as methods where we might accomplish an EVA operation to free the wing. As far as all of the other ideas that are being looked into as far as bringing up on Skylab 3, some additional power-producing equipment - to be real honest with you I just have not had the time to look into those and feel sorry, but I can't answer your questions.

PAO Okay, thank you very much.

END OF TAPE

Skylab News Center
Houston, Texas

Status Briefing
Johnson Space Center
June 3, 1973
3:04 p. m. CDT

PARTICIPANTS:

William C. Schneider, Skylab Program Director
Howard Allaway, Public Affairs Officer

SL-II PC-21A/1
Time: 15:04 CDT
6/3/73

SCHNEIDER - - science. And the ATM for example, we're only getting about, we have only about half the viewing time that we had planned so far. But the principal investigators seem to be extremely happy with the data that they think they're getting. They have been able to see some very scientifically interesting obs - make some very scientifically interesting observation on corona holes, solar corona, and chromosphere and things like that. And in general they seem to be quite happy. From an EREP stand point, as you've been following, we have had some hardware problems. But, as you know, we just finished the 3rd EREP pass. Fortunately, even though the hardware isn't completely cooperating with us, at least the weather is and what data we're getting it looks as if that should be pretty good data when we get it back. Guess the area that is going along most satisfactorily is in the life sciences area. We have taken 2 sets of blood and we've had a complete set of the lower body negative pressure, vectorcardiogram. We have done a complete set of the metabolic activity runs. And 2 crewmen have run on M092 and M093 and the PIs are again looking at all of that data. We're able to do one complete set of the litter chair, the human vestibular. We're weighing the crewmen every day. And we've had 2 sleep monitoring nights. But I guess in the medical world they thing that's been most gratifiying, at least to me, from the engineering stand point. has been that that waste management system has been working so well that the crew even took an opportunity to comment that it was working well. And as you may be aware that's something very difficult to test here on earth and we've had some I won't say doubts, but we were wondering very much how much it would work. And I, too was very very pleased that they found time to take that shower and they enjoyed it. I pushed for a long time to get that. Of course, no need to comment on how they seemed to have taken to the zero-g activity. They're all seemed very well, as you've seen on the TV. No real - there doesn't seem to be any real problems. Now from the corollary experiments, we have had some success there and some problems. S019 we've managed to get 11 frames and 4 star fields. S183 the French UV Astronomy, we had 2 night passes and we got six frames. Unfortunately the camera has jammed. And the PI, I believe has elected to take the carousel out and put it in the film vault and bring the data back. He thinks he's got such good data on those six frames that he does not want to jeopardize it by doing any trouble shooting. We've probably, although the decision hasn't been completelymade we'll probably use the data acquisition camera and maybe get some more data tomorrow. But that then will complete the S193 activity. We've deployed the S009 nuclear emulsion experiment, as well as the transuranic cosmic ray detector.

SL-II PC-21A/2
Time: 15:04
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And the student experiment, the neutron analysis detector, all those have been deployed. We've done a great deal on the habitability experiment and the crew activities experiment. We've got a lot of data on how the crew's been behaving up there and everything seems to be, as you can tell, very well from there. From the standpoint of contaminution, the detectors we have onboard show very very low levels. Lower than we had expected. The windows as you've probably been able to see have remained clear. We think we have basically a contamination free spacecraft. So from a standpoint of doing what we had expected it to do, well quite obviously, we haven't done - been able to run the time line exactly as we had planned prelift off. We're doing infinitely better than I thought we were going to do about 3 weeks ago. And we, I believe have a very very creditable scientific experiment mission on the way right now. And, hopefully it will continue.

PAO We'll take your questions. Wait for the microphone, as usual. Tom OToole.

QUERY What's the status of the EVA, Tuesday, Wednesday? And we got a report over the PAO, mission control, that all three techniques of cutting the strap went well today in the Tank.

SCHNEIDER Well, I haven't had a report yet. I'm waiting for Leke to get back. I did watch them yesterday. I was in Marshall in - watching them in the tank, And it seemed to be going well. The trick is going to be, can you get something to deploy a hand rail, so that you can maneuver down to that area.

QUERY You did that too?

SCHNEIDER Yes, they did it yesterday, too. That is going to be the tricky, tricky thing. The plan yesterday and I assume that - I assume that they pursued it further today, was to provide at least 3 methods of cutting and or I - -

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SCHEINDER They Pursued it further today, was to provide at least three methods of cutting and or IA recommended priority. I think we'll leave it up to the crew to decide just exactly which one to use. From what we can think about her here and the way, and the way we think the hardware is, we think the best thing to do will be to get those bolt cutters on there and to allow the crewmen in the fixed airlock shroud to try to cut them remotely from, from 25 feet away. He maybe assisted by the other crewmen up at the other end. If that doesn't work, why we think the next best thing to do will be to use the pry bar, to try to pry them off, pry off the debris. And then if that doesn't work, though why then we'll try the bone cutters and try and cut it away. I'd like to add a word of caution here on this solar ray deployment, we have a lot of keyholes to go through before we get that thing out. You've got to assume that if we can get out there and the crew can cut that debris, that we can see, you've got to assume that that's the debris that's holding it. And you've got to assume that we can then pull up on the wing enough to get it in fully deployed position. You've got to assume that none of the glass has broken and that all of the wings come down in place and you've got to assume that there's been no damage to the batteries, they've been in they're stored condition. And once you've passed all those knotholes, why then you can say, yeah we've got some more electrical power. I just don't want everybody to get highly enthused and think that we think this is an easy task. There are a lot of things that have to happen and so that it's not a hundred percent certain that if we decide that we're going to go out and try to cut that, that we're going to end up with additional electrical power. Lot of things have to be in the right order. Oh, and you asked what the time was. I've called a meeting at Marshall tomorrow, it will be attended by all the senior Skylab people as well as Dr. Kraft and Dr. Pratrone and Mr. Meyers, I believe Dr. Lowe from the Deputy Administrator will be there, and it is my intention to after I've heard the situation, to make a decision and make a recommendation to the top NASA management as to which way to go and when to go. It probably could be as early as Wednesday although that will be part of the decision tomorrow. To pick a day as well.

QUERY It won't be any sooner?

SCHNEIDER I doubt it. You know we have to pass a lot of words up to the crew. To make sure we have the procedures written correctly. I would think that Wednesday

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is the most, is the earliest possible day. I won't close out Tuesday, but I'd rather do it right than do it rushed.

QUERY What time is that meeting tomorrow?

SCHNEIDER All day.

QUERY Starting early in the morning?

SCHNEIDER About ten or as early as we can get there. Don't sit on the edge of your chairs waiting for an annoucement, as soon as we do make a decision, I promise you I will announce it.

QUERY Will this be just a statement, or will you have a press conference over at Huntsville, or what?

SCHNEIDER I will try to get by with a statement. And don't, it may not come out tomorrow night, you know, we may end up with a few questions and if we are still, if you will, cogitating I'm sure we will put out a short notice that says we're still cogitating. So that we'll try not to keep you in the dark.

QUERY Are there any other big decisions you're facing as far as the operations of the spacecraft? What about the thermal conditions, what about the SPS, will we hear something about the pressure problem there? We hear something about some of the batteries in the ATM not charging fully.

SCHNEIDER Well, the big problem is, as you've indicated, is the electrical power situation. As I think you've been told we have four batteries that do not seem to be getting full charge. Nikon batteries don't like to work hard, they're kind of like me, and we work them pretty hard. We have close at 18 onboard, 2 of them are out of action and 4 of those are in action. Seem to be about, have about 1/2 their power and we are managing the electrical very closely in order to preserve all we have and that of course is giving us great fits in the back rooms trying to pick the right experiments. We have been able to get some pretty good flight plans out new, but they're very hard to come by, because we do have to make the power trade offs. The other, you asked what the big questions are. We do have that parasol up there, that we deployed. The big question that we've got to address and have all of the actions underway to address and are not ready to do it right now. Is whether or not we think that that material will last for the 3 months that's necessary to get up there with Skylab III or whether or not we should

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SCHNEIDER . - - material will last for the 3 months that is necessary to get up there with Skylab III or whether or not we should deploy the twin pole thermal shield. So that's the, the big if question in that area. We have not made that decision. We've got a great number of tests under way both here and Marshall on the materials to try to give us some data that will tell us whether or not we should change out. And if the data says we should, well we probably will.

QUERY Following that up, I was going to ask whether you now are in a position to look ahead to the rest of the mission, and the length of both this mission and the subsequent two missions on the one hand if you get no deployment of the solar panel, and the other hand if you do?

SCHNEIDER Well independent of the solar panel, there doesn't seem to be any reason why we will not go the 28 days on Skylab, Skylab II, barring some further incident. Right now Skylab II is 28 days. Skylab III as you recall we did excelerate it. One of the reasons I said that we axcelerated was because we got a more favorable relative position on the orbital plane on the Sun, so that we have better electrical power when the CSM will be powered down. If we do not get any additional electrical power up there by one means or another, why then Skylab III would probably be either a very inactive mission for the last 3 weeks or conceivably we would not have enough power to do that final 56 days. It looks as if we have plenty of power for I guess something around 40 days, and we have to make some assumptions there as to what you need and what you are going to get. And then the situation is somewhat in doubt. And the same of course goes for Skylab IV. We have three schemes that we are looking at for getting more electrical power. One is of course the deployment of this solar array. We're looking at a scheme whereby on Skylab III, we can bring up oh I guess you could kind of call it like a window shade of solar cells, which we would deploy in some manner yet to be determined and get that electrical power into the workshop. If we could do that, why we would have enough power to go on. We have another scheme which will not, we don't think we can get by until Skylab IV, but we're pursuing bringing up 2 ATM solar arrays with the command and service module on Skylab IV. These solar arrays mounted around a module. It looks like the ASTP docking module. Bring that up and dock it to the rescue port, and deploy the two initial solar arrays. So those are ways that - the primary ways that we are looking at for getting electrical power up

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there now.

PAO Way back in the back row.

QUERY At the risk of sounding like a Monday morning quarter back, one of these batteries that is out right now gave a similar problem on the ground. Why is it that you didn't yank that thing out of there and put a fresh one in? Did you not have a fresh spare on hand, because you were short of money?

SCHNEIDER Tha answer to your last question is, we had spares throughout. Skylab cannot, we cannot by any stretch of the imagination hide behind money shortage givng us any problem here. We've been, we've not had any of that kind of problem. You say we had a similar problem on the ground, I guess you have information that I don't know. I don't know of any, oh I'm sorry, you're talking about the switch, the switch. We had a similar problem in a switch at KSC. That was analyzed, it was analyzed as being a, a quality problem and that it was a peculiar to the piece part that was in there, and you do have this occasionally where a specific serial number item does have a quality defect. It was analyzed to be a quality defect. We analyzed what we had on board and came to the conclusion that we did not have any problem on the rest of them, and therefore did not go through a design change.

QUERY Mr. Schneider, both Rocco Petrone and Ken Kleinknecht talked in the last couple of days about the possibility of extending Skylab II for another possibly 10 days or some figure, in that ball park to take advantage of the high beta angles that will curve after June 22. Can you characterize for us what kind of consideration is being given to that? Is it active, or is it on the back burner while you look at the SAS deployment EVA and so on?

SCHNEIDER Well it is active. It's being looked at obviously by a different group of people. The decision to go to 28 days has of course been one by the medics, and they made a decision to double the 14 days of Gemini to go to 28 on Skylab. In Skylab, they're getting a lot more onboard data and real time data. And they are analyzing whether or not they will have enough information real time in flight to warrant an extension of the mission. It of course will be based, any decision to do this will be based on a recomendation of the doctors. From an engineering stand point, and a straight, getting the science stand point, it's a very desirable thing to do. However, we don't want to take any chances with the crew. We don't want to louse up on medical experiments, and so we'll be very cautious - -

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SPEAKER - we don't want to louse up on medical experiments and so we'll be very cautious in those respects. The doctors are looking at it. They have not reached any conclusion one way or another and if the medics say that it is possible why it's quite probable that we would continue. If the medics say it is not possible that they will not have enough data, why then it'd be extremely doubtful that we would continue.

PAO Howard Benedict.

QUERY If you don't get the solar panel out and you have to just sit there for the last eight days of the mission, what is the value of staying up those extra eight days, besides medical?

SPEAKER We will not have any problem on Skylab 2. At the time the fuel cells are depleted on Skylab 2, the spacecraft gets into the high Beta angle and we should get up to about 7,000 watts out of the ATM solar arrays. As you may be aware, as you go around as the seasons progress, why the angle between the orbital plane and the Sun changes and when that happens why you get more and more out of the Earth's shadow and just at - fortunately we didn't plan this way, but just about at day 20, I believe it's day 21, Skylab begins to come out of the Earth's shadow and when it does so why we get full solar Sun. When the ATM solar panels are exposed to the Sun they're generating about 7,000 watts. Our problem is that when you get on the dark side, why you have to use what you've got stored up in your battery and that's where our problem is. The batteries, not in the power and generation. So once we get around to where we're exposed to the Sun, why we have lots of electrical power. So, the problem comes up in Skylab 3 where after the CSM begins - runs out of its cryos, we then have space, that as I said the other day, such that we are in the good Beta angle and we be able to continue in that. But that goes away just about like it comes and pretty soon you get back into the - your shadow again and then you're back into the power management problem and the power generation could get less than what's required for housekeeping functions.

PAO Tom.

QUERY Bill, could you describe these two schemes for Skylab 3 and 4 a little better than you did? You said a window shade of solar cells and then a module?

SCHNEIDER Hey, well let me just tell you what - you know a lot of people have been working - how shall I describe them - roll-up solar shades. These are literally solar - I'm sorry. These are literally arrays of solar cells which are - have a flexible backing and you can literally roll them up and our idea is that if we can get that up there, then to

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deploy them in some manner on top of the parasol or something like that, which we don't know about t. And then to somehow or other plug in to the electrical power system and provide electrical power. Now, that looks as if we could do it on Skylab 3 if - it looks conceivable that we could do it on Skylab 3, not possible, but conceivable. The other alternative being pursued and that's b-ing pursued most vigorously by the McDonnell Douglas Company. The other one that's being pursued by the Rockwell Corporation is to take an ASTP type docking module, which is a - kind of like a can and to put two ATM solar arrays on it and to take that up just as you would an ASTP docking module. You know you undock from the - you undock from the - separate from the S-IVB turn-around and go back in and pick up the can on the front of the CSM, take it on up and dock to the side port and then go around and dock to the axial port come in and then activate this by deploying the cells all in this plane in here. That we could - the way we'd get that into electrical power is we would probably plug that in to where the CSM is currently plugged in and get ourselves some - oh, probably about 2 kilowatts of power out of it.

QUERY What kind of expense are you talking about?

SPEAKER Well, you have to - -

QUERY Doesn't the module costs 50 million dollars doesn't it?

SCHNEIDER No, we have a docking module is the easiest thing because that's just structure. The - we would take a backup solar arrays and CBRM's and use them. We - it probably is not a very expensive way of going.

PAO Mel Roster.

QUERY Could you clarify the possible extension of the mission? Are you considering extending it only if you do not get the solar array out, or in either case?

SCHNEIDER In either case. Let me make sure that everybody understands there is a possibility that the doctors will find that they have enough medical information, but that remains to be seen. And we're not forecasting at this point, any extension of the mission - -

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SCHNEIDER - that the doctors will find that they have enough medical information, but that remains to be seen and we're not forecasting at this point, any extension of the mission. If the medical data does show that they will have enough on the ground to analyze the health and well being, then it becomes possible for us to extend it. So, I - don't everybody say that we're going to extend it. It's just another one of many, many possibilities that we're looking at. We're trying not to close the door on any way of achieving the Skylab objectives and the Skylab objectives as I've told you repeatedly is to conduct experiments and bring back scientific data. Part of the scientific data is the medical data so we don't want to sacrifice that.

PAO Ralph has another question, then we'll go to Angus and then back to Lee Hickley.

QUERY On the same lines, it's my understanding originally, that a key part of the weightless medical tests were to compare the onboard data with the data after landing and then doctors could make the decision and see how they readapt - -

SCHNEIDER Quite obviously that is the very problem that the doctors are wrestling with. Do they have enough onboard data to where they can say, well all right we can go in 30 days, 32, as much as 38 days and still not invalidate investigations on finding the effects of weightlessness.

PAO Angus McPherson.

QUERY I have two. Could we take them separately? I just want to make sure that I'm interpreting your thinking correctly. Is your thinking at the moment that you wish to deploy the solar panel, not so much for the SL-2 mission, but for the SL-3? And because an EVA of any sort is obviously not a thing that you order lightheartedly? If there were no SL-3 mission would you perhaps not be thinking about an EVA for the solar panel?

SCHNEIDER Well, I can't answer that question because I haven't even thought about it. I can say that on SL-2, as I explained earlier, we are in the mode of managing our experiments by electrical power. If we get this deployed and if there are still solar cells left, and if the batteries are degraded and we do get power, it'll definetly help us in Skylab 2. We will be able to do a much better job on the experiments and we'll for example on the EREP, as you know we have some very short passes, we'd like very much to get back to our original mode of operation, so it's not - we're not doing it just for Skylab 3. On Skylab 3 it becomes a very very important.

PAO Angus had a second one and Lee Hickly, and

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then (garble)

QUERY Okay, I think the second one's fairly simple. If you did take up this ASTP docking adaptor and put it on the rescue module - on the rescue port, this would presumably still preserve the rescue capability because another craft could still dock on the end of that if it wanted to?

SCHNEIDER We could always jettison the additional module that we'd put on. We would still have rescue capability.

QUERY But it would involve jettisoning that - -

SCHNEIDER No, as a matter of fact, now that you - well I'd have to look into it. I haven't asked the question as to whether or not after the CSM leaves you leave it in a condition where you would dock. As a matter of fact, we probably haven't even addressed that question yet. These are all very conceptual. We're having our first preliminary requirements meeting on that one Tuesday out at Downey. so don't think we've begun to cut hardware or anything.

QUERY I think you've just about answered my question but I want to be sure. This Rockwell plan to use an ASTP docking module, as I understand it, hold a solar array that would unfold. Where would that go on the regular docking port for the CSM or on the rescue port or what?

SCHNEIDER On the rescue port.

QUERY Have you found out yet how much time you can or will allow to free that panel?

SPEAKER No, we'll probably leave that pretty much up to Pete. He's a pretty experienced - I suspect that we'll allot a whole day to it. I don't think we'll do much other than - we'll plan on doing much other than the EVA. From what I saw in the water tank, it's an activity that - where the handles and the restraints are at best marginal, we've learned that you can't do anything without restraints so we do have to have some restraints there obviously not the best in the world. They haven't been really preplanned, so I'm fairly sure that the crew who does this will work pretty hard and I think that what we'd end up saying is that that will be the majority of their activity for that day.

QUERY Bill, considering the interior size of the OWS, is there a possibility of them rehearsing some of that EVA inside before they go out?

SCHNEIDER Yes - -

QUERY I expect some - -

SCHNEIDER Yes, one of the things that we have been planning on proposing to Pete, is that he try to manipulate the tools and what not on the end of the long boom to get the feel for how that handles. There's no doubt he has the world's finest zero-g training facility up there.

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PAO I think we had (garble) and then I've had a couple that have been phoned in from people across the street.

QUERY And will you leave it to Pete Conrad to make the decision as to who does the EVA?

SCHNEIDER Yes, I think we will. I suspect that - -

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QUERY - - and will you leave it to Pete Conrad to make the decision who does the EVA?

SCHNEIDER Yes I think we will I suspect, I suspect it will be the Commander's decision. But, I suspect the Commander would want to go out there. We think Pete and Joe will do it, but I don't think we'll put any restrictions on them. We'll pose the question to them and the problem to them, and let them make the decision.

QUERY Bill, I have a couple which have been called in from people who are listening at their black boxes. Could you explain the CSM drop in pressure?

SCHNEIDER Well, I just heard that as I was standing in here, I assume it has to do with the temperature of the CSM. As you know we've been, we've been trying to conserve power there by powering down. And I suspect that one of the tanks is getting a little cooler than it should be. And we'll probably have to turn the heater on and bring the pressure back up.

QUERY And the other one is what is the status of the body mass measurement device? Is it completely out?

SCHNEIDER To my knowlege we've had no problem with the body mass measuring device. We have been getting astronaut weights regularly on a daily basis. You may be referring to the small mass measuring device, where we had two of them onboard. One in the waste management compartment and one in the wardroom. I believe the one in the waste management compartment had an electrical malfunction. They were using the other one for both tasks. I have a vague recollection that we found the truoble on that and they both work. But, I'll have to find a better answer on that one.

QUERY One Method being discussed for pulling the panel out if you do get the angle aluminum cut is to have the astronaut use the firemans pole type thing over his shoulder crouching and then standing up. How would he do that? Where would he stand and how would he hold his feet steady?

SCHNEIDER Well, the way they were practicing it yesterday, this is not the rigid fireman's pole, it's the thing that is called the BLAT. That's the Big long adjustable tether. This is a, you've seen them floating it down through the spacecraft when they do that television. It's that long tether, it's 30 or 31 feet long and it has a hook at either end. The proposal would be after the crewmen got down to the area of the vent module on the solar panel, would be to attach by a couple of hooks into holes that already exist there some tethers to which he would attach this BLAT. And that the other end would be a attached

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behind them back on the, back on the truss structure back here. They would then have a flexible, flexible tape that went from about here, up to here. Of course this would be down on the side. If he were successful in cutting the debris, he would then get his, he would stand right around the hinge line on the lower side of the hinge line if you will, on moving part of the hinge line, and would raise this and crouch and get it over his shoulder and then using his legs stand up and snap the, snap the actuator, the damper actuator, which is frozen and allow the panel to swing free. He must break 2 little restraints. He did that, yesterday, he did that in Marshall with exerting a force of about 100 pounds, which is no sweat at all. And that's been very repeatable, we've done it back at the factory, and we've done it there at Marshall several times. And I expect to see it done again tomorrow. And he stands as I said here, pushes out one, breaks your pole, you adjust the tether back down to where he now can exert force again. He exerts force again and breaks the other one. And then the dynamic analysis is that the solar array can be gently eased into position and it will lock in place and everything will be Okay. And that too is one of the things that we have got to look at tomorrow, the dynamics of the situation. What kind of energies are involved and is it safe to do this. Of course that is the primary thing that we'll be examining tomorrow is the safety aspects of this. Is there any unusual hazard that we don't wish to accept.

PAO We have a question here. We'll take one or two more and then let Bill get back to work.

QUERY I've been hearing for at least a week that the damper is frozen or that the actuator is frozen and that clevise has to be broken and I'm not sure how we know this. Is this the temperature information?

SCHNEIDER Yes, we know it is from this.

PAO If there is no more questions, thank you Bill very much.

SCHNEIDER Okay

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 3, 1973
9:45 a.m. CDT

Participants:

Milton Windler, Flight Director
Milton E. Reim, Public Affairs Officer

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PAO All right. We will get started with the Sunday morning, June the 3rd, change-of-shift briefing. We have this morning the overnight man, Milton Windler, Flight Director for Skylab, and we'll let Milt start it off.

WINDLER Okay. Well, we had another relatively calm night, although the crew did report that they heard a pump change frequency. And they got up and looked around, Joe and Pete did, around midnight, apparently, and they decided it had something to do with their refrigeration system. We don't see anything wrong with it, although there was some discussion with the crew about their thinking that they heard TACS firings, which we don't see on the instruments. And we don't really believe are happening. And we think they're hearing something else and the refrigeration system is one area that might be doing that. There are known valves in there that make noise, plus there are valves in there also that cycle to direct the fluid flow. And that also changes the pump pressure and the pump sounds. So probably that's what they did hear. But, for the first time, anyway, that we know about, they did wake up in the night and got up for a few minutes and drifted around, I guess, is the right word, to see what was going on. Other than that, it was a pretty quiet night. Today we're planning to do an EREP, as we discussed yesterday. We do plan to get some TV out of the window. And we'll be doing some more medical runs. And then tomorrow they'll also be an EREP with medical runs and the cal rocket that we talked about yesterday, which is, I don't know how many are here that were here yesterday, but the man that asked the question, I guess, is not. But that's a black brand, we found out. So that's about the size of what's happening right now. It's just - We're doing fairly well, I think, in conducting the experiments. We're staying pretty well on schedule for the medical runs, and the ATM folks are getting most of the daylight cycles that are available; that is the ones that are not used by EREP. The power continues - Dividing the power among all the experiments areas, of course, continues to be a problem. And we - But we're getting a little bit better at understanding where it's all going and being able to predict it in advance and, thereby,, get our flight planning done. So I guess with that I'll stand by for questions.

PAO We'll start with Ed DeLong here.

QUERY What is your latest understanding of the status of the EVA?

QUERY Okay. There is a giant, huge meeting, as my kids would say - a meeting of all the principal characters - participants tomorrow at Huntsville in which there's a very lengthy agenda covering all aspects of it. And I don't remember all the details of the agenda. In fact, John Disher may have briefed on this, I'm sure, a couple of days agao. But, basically they'll go into the power situation, what our status is if we don't do anything, what the problems are involved or in the energies available or the energies inherent in the wing, in the scrap, and everything the potential dangers involved there, what some of the contingency procedures would be, the crew procedures that would be involved, the equipment, all those aspects of doing it in, hopefully, that day. Tomorrow we'll wind up with a decision on the advisability of doing an EVA to try and deploy the wing. And after that time we can get that cranked into the Flight Plan, I guess, in another couple of days, something like that. So we're looking at the latter part of this week, I guess, or the middle to the latter part.

QUERY Okay. You sort of hit on something I was going to ask about next. Last night, late, one of the last things before the good night the MOCR went up to the crew saying, it won't be Tuesday. I just wondered - -

WINDLER Why they did that?

QUERY What was the rationale that ruled out Tuesday after everything we'd heard previously said, Tuesday is the, I know, earliest possible date but now it's been ruled out.

WINDLER Well, the - That was in response, I guess, to the fact that the, - Mrs. Conrad said "Happy Birthday" to her husband and had said something about the EVA on Tuesday, and since he didn't know about an EVA on Tuesday, he was curious about that. And so the other conversation was just the ground pointing out that there were no definite plans for the EVA yet. But this meeting hasn't happened - -

QUERY Okay. That did not rec - That did not represent a management decision that it can't be Tuesday?

WINDLER No, it didn't. It just - I really don't see how we could decide on Monday and do it on Tuesday, myself, but I suppose if you really had to, you could. But it would be very difficult. And we don't anticipate doing it that soon.

PAO Hal Rosser over here, and then we'll get Martin Cramer.

QUERY Milt, what's the EREP plan for the track for tomorrow, Monday?

WINDLER It goes across Florida or that south-east part of the country and on down across the Bahamas and winds up at the San Juan trench featuring the ocean, of course.

QUERY Milt, which team does the preliminary and the detailed planning for the

WINDLER Well, right now we don't anticipate having any big changes in our manning so it would depend on what day it is. We're going through a sort of a change right now in that this is my last night to do the summary plannings, and I'll be off for a couple of days and my team. And then

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we'll be doing executes for about 5 or 6 days. And let's see, Chuck Lewis's team will be doing the summaries, and I guess Don Puddy continues to do the - I mean Neil Hutchinson will be doing the details for the next several days. Actually, though, we have some people that specialize in the EVA area, who are not assigned to teams right now. They're people that specialize in the hardware. And they have been planning all along to support the EVAs when they came along. So they're working on the procedures and they will be part of the teams whenever it's scheduled. Incidentally, let me make another point here. If it happens to occur after - if it happens on Wednesday or in the next 5 or 6 days, it will turn out that the team - that our team, who'd be on for execute, would be a team that actually has simulated the EVA that is the normal EVA to replace the film. So that would be a fortunate set of circumstances if it turns out that way. Looks like it will.

QUERY How does the crews' sleep patterns look? Has there been any abnormalities or anything unexpected there?

WINDLER No, I don't think so. I would say it's very, very normal. The day that they were given off they slept in late, apparently, which is what you'd do if you had the day off or you'd try to. And on the days when they thought that they had work to do, like a normal day, they responded as you probably would if you had something very interesting happening that day. You might wake up a little early. They've done that. They did that yesterday - got up just a few minutes early. And after their day off, they were just ready to go. So I'd say, you know, that's not to dissimilar, and the fact that they got up in the middle of the night is just, isn't unusual either since, you know, if you're used to a constant noise like your air conditioner or something like that, and all of a sudden it quits while you - the change in noise is something that gets your attention for a few minutes. And then you get use to it again.

QUERY Do you have any feeling about who it might turn out to be, who actually goes down the side of the workshop?

WINDLER No. We've put in some words on that, I guess, in sort of speculation. But I guess that's part of this meeting, Marty, do you know the answer to that?

SPEAKER No. Sure don't.

WINDLER I think - I really would say that hadn't been decided for sure yet. We've got some potential candidates and they've been said, and now I've forgotten what they are, to tell you the truth the ones that we think are most likely - but I'd have to say until you decide on what exactly the procedures are you'd have to play that, of course, against the training that they've all ready had.

SL-II PC-20A/4
Time: 09:53 CDT
6/3/73

PAO Anybody else have a question? Ed Delong.

QUERY How are the batteries behaving? Are they beginning to show an ability to take more charge?

WINDLER They've - Well, we really can't tell that until we've put some stress on them. And we're not putting stress on them. We're avoiding that. The main way - the primary way that you'd have really of checking out that, you'd have to take them down to where they tripped off again at the low voltage and see where that is. And we are working fairly hard to see that that doesn't happen. So, it's not - there's really no new date on that. And the batteries have behaved very well since - for the last several days.

WINDLER Should I answer these two questions for Mary Bub at the Cape? The question is; "Did the crew spot any unusual solar activity or solar flares this morning? And they haven't told us that they did. So, we have to assume that they did not, since they've been pretty vocal in reporting things that they've seen. And, secondly: "If the solar panels cannot be repaired are there 8 days when they cannot not do experiments? And we think yes that's the last 8 days of the 28-day mission. And yes that's essentially true when the CSM fuel cells run out of cryos, why we will be limited in our powering and we'll probably not be able to do any experiments after that time. Although, we're getting a little bit more clever at finding odds and ends of power and there might be something we can do, but it doesn't look too good on that subject now.

QUERY Just before coming over here, I thought I heard them say that they had detected carbon monoxide 10 to 15 parts per million, I think, is what they were talking about. Does that sound right?

WINDLER I know nothing about that. I didn't hear that, while I was - I haven't been listening to air-to-ground about 2 hours now. I've been in another meeting, so I don't know about that.

QUERY Would that be a normal type figure to you?

WINDLER I - -

QUERY (garble) made of it, you know.

WINDLER I don't know either.

PAO We can check and find out for you Al.

PAO Thank you.

END OF TAPE

Shift Briefing
6-2-73

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 2, 1973
7:21 p.m. CDT

PARTICIPANTS:

Don Puddy, Flight Director
Richard H. Koos, EREP Officer

Milt Reim, PAO

SL-II PC-19A/1
Time: 19:21 CDT
6/2/73

PAO All right, tonight we have Don Puddy, Flight Director and Richard Koos the EREP officer. We'll start off with Don.

PUDDY Okay let me give you more or less a real quick synopsis of the spacecraft's status. Would you believe we broke the 80 degree mark today? We are presently at 78-1/2, and we think over the long term it may be possible to get down as low as 75. At least that is our hope. And we are still continuing to drop very slowly. As far as electrical loads today, we ran anywhere from 3200 to about 4500 watts. From the stand point of the flight plan, we executed the flight plan just exactly as I had briefed you last night. We consider that we had a very good day from an experimental standpoint. We met all of the objectives. You may have heard one call where we switched one of the medical runs and one of the calibration maneuvers that we would make, calibration manuever - calibrations that we were making on the small mass measurement device. This was strictly to give us a capability of going without a momentum dump, which was unnecessary. Other than that the flight plan was executed just as published. We had a very good day. The EREP pass that we had was probably one of the most important that we could have accomplished during the mission. There are two areas that we nominally like to cover. One is the pass that we had today and the other is up in the northeastern part of the United States. Of course we also like those passes that come down through the HATS area, or what we call the Houston area test site. The pass today started up in the Pacific and ended up as I briefed you last night around Guadalajara, Mexico. It had associated with it numerous of those items that we like to study, such as pollution, San Andrea's fault, urban development, population centers, acreage, crop disease, all of these type of things were in the sites that we covered. And today, I think we had about 35 sites that we feel like we got good data from. I think that's about it as far as just a generalized overall capsule view of where we're at today, no new major anomolies or anything like that. The spacecraft is cooking along. I think we are in a standpoint now where we're looking at each flight plan from the standpoint of power and momentum. But we've got ourselves into a cycle where I believe we're going to go ahead and do our daily routine thing that we had planned for the mission. It looks real good. So let me open it up for questions.

QUERY I've got a couple of them Don. Joe Kerwin this morning mentioned something about some food. And I understood him to say something about maybe food spoilage or a stowage problem one. And I wasn't sure which.

SL-II PC-19A/2
Time: 19:21 CDT
6/2/73

PUDDY No, I think you misinterpreted his comment this morning. What he asked about was food that they had not opened. In other words it was overage. The food is stored in a particular way, and what has happened is they unpacked it, some of it they didn't eat. It's not spoiled. And his question was whether or not they wanted them to go ahead and restow that food. If so how we would like to have it restowed and saved for the Skylab III crew as overage. And we have told them that yes, we did not want the food disposed of. We did want it saved, and we are giving them a procedure tonight as to how we would like to have that food restowed.

QUERY Are you talking about the food that they are not eating in their own meals and that they are not opening and all.

PUDDY Affirmative.

QUERY Okay. What about the television camera that was mentioned that went belly up during EREP pass?

PUDDY We've got some questions going up to the crew on that tonight with some suggestions for some malfunction procedures that they may be able to run. I don't want to go ahead and say right now that we have lost one TV camera. The crew right now seems to think that there may be a problem with that one camera. But until we have gone through that malfunction procedure for that particular item, we are not writing it off. And we still have another, so.

QUERY This overage, this business that they are not eating the result of just providing them with too much, more than they can eat at a meal?

PUDDY Well, let me say that Skylab food was not planned to be on a mininum diet basis. There is plenty of food there. You will also remember that they did carry some food up in the command module, and I surmise, that's just a supposition on my part based on the fact that they have not reported in general that they are not eating the food that some of this is the fact that they are eating some of the command module food during the first few days. And these cans have just been saved from that time frame. You know they went into the OWS area and actually unstowed that food a couple of days later. So, if from what was originally put in there to be eaten since they did eat some of - -

END OF TAPE

SL-II PC-19B/1
Time: 19:21 CDT
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PUDDY - a couple of days later, so if from what was originally put in there to be eaten, since they did eat some of the food in the command module that they took up with them. There's certainly going to be some spare food and they're just asking what to do with it. But they didn't give us any indication that it was a tremendous amount of food that they were talking about. It's just a few cans, but we still said since it's not spoiled, we'll save it.

QUERY They've been up there, I guess nine days - just about a full nine days now. Have you had any reports on whether or not they've gained or lost any weight? Pete said today he may have been kidding when he was talking to his wife that he was gaining weight.

PUDDY No, what we have done - I believe it was yesterday. We ran a calibration on the body mass measuring device and that data is still being put together. We are giving the crew tonight some data points based on our analysis to this date of that calibration data, which will correct their on-board calibration curves. And some of the things that you reported, if you listen to the air-to-ground, the crew in their preflight calibration curve, did not wear shoes. Two of the crew members now are wearing their shoes with the triangular cleats on them while they're making those measurements. And that in itself induces about a 5-pound error in what they should have had in their calibration curve, because they're onboard calibration curve was originally designed around the fact that they would not be wearing those shoes. Two crew members are wearing them - one isn't. So we're taking that and the calibration data into consideration and uplinking a pad to give them new data as far as - so they can plot themselves just exactly where they are. To the best of my knowledge, and I cannot say absolutely, there has certainly been no concern expressed to me over any loss of crew weight.

PAO Bruce?

QUERY After the EREP pass they were talking about barber poles on CBRM number three. Was that as you expected or you were just hoping you might get it back on line after that pass?

PUDDY No, we did do some trouble-shooting on CBRM number three today that was scheduled into the flight plan. We did not have any joy with that. So right now we're still without CBRM's three and 15. The barber pole that they reported after the EREP pass - what happened there was the crew, in cycling through the indications, saw that and forgot that it was CBRM three which was one that was off line and they just happened to mention it in the flurry of the moment. But it was no new failure.

SL-II PC-19B/2
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PUDDY Okay? Have you got one more? All right.

QUERY After the EREP pass, I think I heard that the batteries were charging properly. When you left mission control what percentage had they gained in charge?

PUDDY We have worked all day long with 16 completes and we have stayed that way. When I say - that's not fair to even phrase it that way to you. When I say 16 completes what I mean is that we have charged all of the 16 batteries that we have to a complete state of charge prior to the nightside pass, so we have been able to maintain greater than energy balance - the energy balance means that the battery is almost there but hasn't quite reached the full state of charge. We have done - been able to maintain that power level throughout the entire day.

QUERY Did it come as a surprise to you when Jane Conrad said the EVA is going to be Tuesday or Wednesday?

PUDDY Well, no not - let me not say that it came as a surprise. There is a meeting scheduled Monday, I believe it is, at Huntsville where the various NASA management personnel are going to discuss the results of the work that has been going on down there in the water emersion facility to investigate the various aspects of how we possibly could do an EVA and deploy wing-1, AM wing-1. As far as that being Tuesday or Wednesday that certainly has not been decided and it won't even be considered until after the results of the meeting on Monday.

QUERY I assume were talking about Bill Schneider and the center directors who would be meeting at-

PUDDY Bill Schneider, Chris Craft, Kenny Kleinknecht, Lou Belew, these people.

QUERY Got a small question. There's something that's been bothering me. I never had a Hasselblad with a fuse on it. What are the fuses for? Is it film transport mechanism or what?

PUDDY I think you're awful close. I did not, personally view that piece of hardware. As I understand it, there are some fuses in the film drive magazine or in the actual - well it's in the film drive magazine - that if the magazine does hang up, in which - and this was a failure mode that we did have, it can blow a fuse. Now these are replaceble fuses and they did go in there and put another fuse in and the same magazine blew another fuse. They have replaced that magazine with another magazine, and the Hasselblad is working.

QUERY A thing for Mr. Koos. Do you think you have some very good pictures today on the EREP pass?

KOOS Yes, we got some very data today.

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We have all the sensors on. 198 was on the whole pass, 192 was on the whole pass. We had the 193 altimeter on for the first - about two-thirds of the pass and then we had the radiometer and scatterometer on. S-194 is always on for every pass.

QUERY On the first pass, I just remembered, you had trouble with the S-190 and the S-191 instruments. Are they okay now?

KOOS Yes, we did a small checkout today in the prep for the EREP pass and what they did is actually scratched the film, took the magazine cassette off 190-A, scratched the film and did a film advance to verify the film was actually moving and we actually lost the malfunction light also. So that we know all six cameras on 190-A are working. What was the other - I didn't recall the other - what was the other experiment you were talking about?

QUERY The infrared spectrometer was giving them some trouble wasn't it? S-191?

KOOS S-191. Yes, and the READY light didn't come on again today and we're going to have to go back into the - look at the dump tape - -

END OF TAPE

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QUERY - trouble, wasn't it?

PUDDY Yes and the ready light didn't come on again today. And we're going to have to go back into the - look at the dump tape, voice tapes. We had them, during the checkout, give us a number of readings and we'll have to get those to get a trend - temperature profile on it through that checkout period to really see what - Possibly the coolers not functioning exactly right.

PAO Okay, thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Status Briefing
6-2-73

Skylab II Status Briefing
Johnson Space Center
June 2, 1973
3:15 p.m. CDT

Participants:

John E. McLeaish, Public Affairs Officer
Kenneth S. Kleinknecht, Manager of the Skylab Program Office

SL-II PC18-A/1
Time: 15:19 CDT 9:20:19 GMT
6/2/73

PAO Okay, we're ready to get started now, if we could take our seats please. We have with us this afternoon Mr. Kenneth Kleinknecht, who is the Manager of the Skylab Program Office at Johnson Space Center. And Mr. Kleinknecht is prepared initially to briefly go over the status of the flight as of right now and then respond to your questions.

KLEINKNECHT Okay, it looks like the crew has stayed pretty close to the flight plan today. And all the activities that were planned have been carried off without any problems. The temperatures seem to be sticking around, about 79 degrees at this time. I wouldn't say they are stabilized yet, but we wouldn't say that until it has been there several days probably. We have a little over 47 percent of the TACS, propellant TACS gas remaining, which is above the red line. We are using very little TACS now - gas. We've just completed what sounded like a very good EREP pass. Of course you must realize we don't get any EREP data until the command module returns. It's all on tape and photographic film. But, from Paul Weitz's discription of what went on during that pass, it appears that all of the EREP instruments - sensors operated satifactorily. Pete will be going to do some activity with S183 now. Joe Kerwin still doing housekeeping activities. And Paul Weitz is going to take a little exercise now, at this time. We expect that the remaining activites today will stay on flight plan 2. The power situation is sort of holding its own. We haven't had any more degradation of solar array system or the power system that we have functioning now.

PAO Okay, let's throw it open for questions now. Please raise your hand. Bruce Hicks.

QUERY Ken, what's the status on the EVA planning now? How far have we progressed since yesterday?

KLEINKNECHT Dick Slayton went to Huntsville this morning, leaving about 10:30 or 11:00 I think it was. Rusty Schweickart is down there now. And I believe Rusty is in the tank at this time. They have developed a procedure which Dick will review, we'll probably have a review here possibly tomorrow night some time. And Monday we expect to have a management review and I think we'll finalize the procedure if we do it. We believe at this time, based on what we know, and for myself with the lack of the knowlege, detailed knowlege, of what's going on at Huntsville, that we can either release or cut the angle, or what we believe is an angle that is holding the SAS beam down. The procedure that is being worked on now is to take about five of the work poles about 5 feet long each to put the little mushroom tool on the back end of them, put the bolt or cable cutters on the far end of the poles, to extend that out by the rope arrangement on the bolt cutters and pull those jaws down on one of the doors on one of the vent modules on that SAS beam, and it will act like a pair of vice grips and support that end of the rod. The rod can then be fastened up in the area of the discone antenna on the fixed airlock shroud which gives some handholds that you can move down the beam. And we are planning to attach the strap that you've seen stretched through the workshop that they can use for guiding and handholds as they go through the workshop - attach that to the vent module and then back up in the area of the fixed airlock shroud. Give you a rope with sort of a loop, you can get under that and by standing up put a force on the beam. It will, we believe that the actuator is frozen. If we can get enough force to shear the clevis bolt in that actuator and release that frozen actuator and then we hope it will move freely to its normal deployed position. Now as far as what we think is an angle now that is holding the beam, we at this time don't believe that there is anything else holding it. Although, we can't see everything underneath the beam. I don't know how that is going to be cut. They have cut, at Huntsville, with the bone saw. They have been able to cut that angle. There is a prybar-crowbar aboard the workshop, it was one of the on-board tools for maintenance and repair. I think that crowbar doesn't have a hook in it like a regular crowbar, which may be a little more than a foot long with pointed, not sharp pointed, but a pointed end on one end and flat on the other that can be used to pry this piece that's holding the SAS beam down.

PAO Bruce Hicks, let's take one more from Hicks.

QUERY Will Pete do the EVA?

KLEINKNECHT I don't know at this time who will do the EVA.

PAO Reg Turnal.

QUERY You laid great emphasis on if you do it. Does this mean that you prefer not to?

KLEINKNECHT No, I think we certainly want to review again the requirement for doing it, and do we have confidence that if we go out and do this activity that the crew, the flight crew, has not had any training on. Certainly there is some risk every time you do an EVA. We want to be sure that we have confidence that we're going to do some good. We're not going out there just as a stunt.

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PAO Mark Kramer.

QUERY What you just described as a possible procedure differs somewhat from what Rocco Petrone talked about yesterday. How - what do you do initially? Do you initially cut that strap with the cable cutter and then use the cable cutter to grasp onto the box and use the whole pole as a handle?

KLEINKNECHT No, I haven't cut the strap yet. That maybe, it may cut the strap first. I don't know. Yes, that is a possibility. I don't know whether the cable cutter will go under that strap or not.

QUERY I see. So, the devices that might be used for cutting the strap include the cable cutter and the bone saw and you also might break the strap using the pry bar.

KLEINKNECHT If you recall Pete's first description was that it looked like that angle, he didn't describe it I don't believe as an angle but it was metal with bolts in it, was embedded in the SAS beam fairing. The crowbar I believe if we would get under it and pry it up and get it - -

END OF TAPE

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SPEAKER ...crowbar and I believe if we get under it and pry it up and get it out of the fairing then could probably just be moved off to the side.

QUERY Is that - -

QUERY Wait, wait for my - -

QUERY Is that the specially designed twin prong prybar that went up.

SPEAKER No.

QUERY This is a regular crybar that was launched with the workshop.

QUERY I see. And what about the idea of, once having done that of moving the beam by inflating this plastic bag?

SPEAKER I don't know anything about any plastic bag. I'm sorry, that I didn't hear Rocco's comments yesterday.

QUERY That really messes us up. I did. I'm not smart. I'm not sure that this is anything different. I don't know whether we need this other mike. Rocco was talking about a number of possibilities at the time. I think bringing you up to speed there's certain possibilities that are being looked at a little closer, so I'm sorry but I wanted to elaborate on that. I didn't aggree on your point - -

SPEAKER And I haven't been there and I haven't been in constant contact with them and I wouldn't be surprised if they haven't looked at some things that I haven't described and that they won't be looking tonight and tomorrow morning at some things I haven't described.

QUERY And presumably if and when they come to do the EVA, there's no reason why they should not take out more than one device with them. I mean the bone saw is at least a fairly handy dandy little device.

SPEAKER That's a handy dandy little device, but it's very sharp and it has some very sharp teeth on it, you know. I think you've seen it. It's one of these things with a ring in it that's a saw blade in any direction.

QUERY So would you in fact aim to just concentrate on one - if and when you lay down the procedures for this EVA, would you concentrate just on all day just one method of freeing the beam or the - -

SPEAKER No, I can't give you a final answer on that, but I think we're talking about a pry bar, a saw, a cutter, they will develop the procedures for each any one of those. I think certainly Pete is there. Pete and the crew is there. They have seen it and if Pete already knows that one of those procedures that may be developed on the ground will not work, it's his perogative to say that isn't any good, I think we ought to go this way. But certainly we wouldn't go out with one tool only. We'd certainly have them all available but we wouldn't go out with one and find out that wouldn't work and we should have had something else that's available.

PAO John Wilford.

QUERY Does this mean that we'll know sometime Monday what the decision is about an EVA and presumably when the EVA would take place?

SPEAKER I expect that there's a good possibility they - I don't think it'll be any earlier than Monday, but since we're still developing procedures and working in a neutral buoyancy facility at Huntsville, we haven't got the procedures finalized. I can't give you a firm time. We do want to do it just as soon as we can and certainly we wouldn't do the EVA any earlier than sometime Tuesday. The power, even though it's pretty much stabilized, it is low and we want to get power so we can do experiments as soon as we can.

QUERY Than if - assuming you're going to do it, about how long would this EVA take? What - you're talking about an hour - two hours?

SPEAKER If I knew the procedures I could give you that. I would say it would be in the one and a half - two hour time frame, is my estimate.

QUERY And how long - assuming that you're successful - you deploy this panel. About how long after the deployment should you know if you're getting the full benefit of those panels. How much engineering data do you need to find that out?

SPEAKER I'd guess there, about 24 hours. Almost immediately we ought to know whether there's any power getting to the batteries and the CBRM's, but I don't know how long it would take to make an accessment as to whether they're all working - whether there's been any damage done to any of the cells. We know, certainly know what power it should generate. It's in the neighborhood of 2500 watts.

PAO The gentleman behind Mark Cramer, there.

QUERY What do you think are the main risks and dangers associated with this EVA?

SPEAKER Same as any EVA, you're in a hostile enrironment, in a suit without any backup should you puncture the suit. We certainly will not take any risks in working in the areas where there are very sharp objects. The crew is well aware of that and I don't think they'll take any risks. I don't there's any safety risks associated with doing it that you wouldn't have on any EVA. There's certainly some risks on success because of the - first we don't know exactly what the conditions are and what's going to need to be done and we couldn't train on it like we trained for a normal EVA.

PAO Arthur Hill.

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QUERY What would be your feeling as far as the EVA running past a daylight pass and than into night time?

SPEAKER I don't think we'll plan it while he's - if it will go into night time. I guess if it's (garble). I just haven't thought about that, but they certainly can stay if you will, status quo, during a night pass. There are lights in the area of the airlock module. I don't know whether there's any plan or procedure for getting any light back in this area or not.

PAO Peter Os.

QUERY Has TV of the EVA been ruled out definitely?

SPEAKER Our policy is that we will not do EVA or carry any extra cameras - do TV or carry any extra cameras on EVA. We did - do have for the normal film retrieval, a station to put a 16 millimeter DAC camera. If we use TV or any other cam - - or TV during this EVA we have to stretch a cable from inside. It certainly encumberes the crew and that does add an element of risk. The cable can get in the way of the crew and it takes longer time to set it up. You have to bring it back in when you're finished with the EVA and if for any reason you wanted to get back in rapidly, you have to wait and retrieve that cable and camera before you can close the hatch. We believe that that is an unecessary risk to impose on top of - the inherent risks in EVA, which are not particulary high, but it doesn't add anything to the job we're trying to do.

PAO Bruce Hicks

SPEAKER I would be strongly against any further incumberance on the crew.

QUERY Two questions Ken. First of all, there are only two EVA helmets and visors available that can Sun visors and as I understood before the launch of the crew and also - - Go ahead with that.

SPEAKER I think there's only two with the UV protection on them, but there are helmets - -

QUERY I meant the visors - that - I would hope there's another one at least. (Laughter) The other thing is how fast after a decision on Monday do you think Pete could be ready to do? Or any crew member be ready to do an EVA?

SPEAKER I haven't given you a decision on Monday yet - I think Tuesday is our earliest we could do it.

PAO Al Slagle.

QUERY Will a third crewmen be occupied in the same way as he would on a normal EVA?

SPEAKER I assume he would. Our procedures for EVA are to have him in a location where he can watch systems

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and could get to the command module if necessary.

PAO Mark Cramer.

QUERY Further question on TV. What about the other airlock? Is there any chance you might put it out the other airlock?

SPEAKER We can put it out the other airlock but you aren't going to see anything.

PAO Gentleman back at the back.

QUERY Seriously though, we went through the TV on the other airlock and sort of have to gerry rig the TV. It will not tilt far enough to - with the TO-27 tilting device to get down there. You can gerry rig a mirror assembly from - I guess it's a 16 milimeter - I think it's a Hasselblad camera. So that you could probably see the area. You have to remove the TV from it's bracket that attaches to the TV boom, slide it back, put some screws back in, put some tape on it. There's some risk there in - you'd have a - this is all done for the way they were able to work it out on the ground. You'd have about a tenth of an inch clearance when you put the camera in the airlock, between that and the mechanism for opening the door of the airlock, so there's some risk there that you interfere with that mechanism and damage the airlock. After you get it out, you could conceivably have a problem that said you might have to - may not get it back in - have to jettison it and we'd have lost two airlocks and cannot do anything else with that TO-27 boom.

QUERY Something in a much lighter vein, sir. I'm to understand that Mr. Conrad was awakened this morning with Mrs. Miller singing Happy Birthday. Is that right?

SPEAKER I don't whether Mrs. Miller sang "Happy Birthday" or not but it is Pete Conrad's birthday today.

END OF TAPE

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KLEINKNECHT I don't know whether Mrs. Miller sang happy birthday or not, but it is Pete Conrad's birthday today.

QUERY Who's Mrs. Miller?

PAO John Pollack. Pollack is back in the back.

QUERY I had a question, but it was driven out of my mind by Mrs. Miller.

PAO Do you still have a question?

QUERY Yeah, I still do, as soon as I can remember it. It had to do with the, I'll come back.

QUERY I hope you'll let me forget too now.

QUERY Dr. Petrone was saying yesterday that there was some possibility of extending the length of this mission beyond 28 days. I wonder if you could go into that a little bit?

KLEINKNECHT Well, yes we are looking at that and considering it. Power situation as it is now, such that at the time on what we expect to be on day 20, the fuel cells in the CSM run out of cryogenics. We have just about enough power to sustain the systems in the workshop and keep the - sustain the CSM. No power for experiments. However, due to the Beta angle change, the power is increasing very rapidly and on day 28 we have about 7000 watts of power from the fuel cells because of the increased Beta angle at that time. It takes about 3700 watts to operate the workshop and about another 1000 watts for the CSM, and that occurs for just about 10 days from the day we come home to 10 days thereafter, or up through day 38. Certainly we would be remiss in not looking something like that, in event we do not get the SAS beam deployed, the SAS deployed and don't get any additional power. That 10 days and that power, we should have in the neighborhood of, I guess 1000 watts for operating experiments. We could probably pick up and do all the experiments that we normally planned on this mission, with the exception of those that we just can't do because they had to be done out of the solar airlock. Now, there's some - many things that have to be considered there. For some 6 or 7 years now, we've been planning a 28-day mission, and that was established because we sort of went from 3, to 7, to 14, to 28. We do not have any medical - we do have some medical data. We do not have much of the data that the life sciences people and the doctors would like to have to evaluate beyond 28 days. Some other - Have to consider the recovery ship, the recovery time, if we extended, say 10 days, we would be landing at night. Recovery would be at night. We have excepted the fact that we can have nighttime recoveries, and I don't believe that would be a problem. But it takes some time. You don't just turn it on overnight. If you're going to plan to do it, you'd like to do a little training. You can do that, we can do that with the recovery forces now. There's another circumstance that the Ticonderoga is scheduled to go into moth balls on the 24th of July, too. But, that's also been planned for awhile. So I think if we didn't look at every way that we can possibly recover and retrieve the data from this mission. We'd be remiss.

QUERY What would be the effect on later missions? That's got to come out of one of the later missions, but if there's no deployment of the solar panel, perhaps there won't be any later missions.

KLEINKNECHT I don't know much has to come out. That's one of the things we have to look at. What might be the trade off. I would think we'd have enough water. I don't know how much food they're eating, although we do know - someone knows. I can't recite that to you at this time, but that's correct, we had planned for about 140 days of habitation, and you start using into your food, your water, your oxygen, and you might lose it off of the end, but that's another trade off. We certainly have a degraded vehicle, and it doesn't have a higher probability of being up there 8 months from now, than it did before we launched it.

PAO John Pollack, again.

QUERY The SEVA on the first - on launch day was done substantially out of communication with the ground. In view of the fact that the crew has not been trained for this proposed EVA, if you decide to do it, would you make an attempt to schedule it for maximum ground station coverage, or would you make an attempt to schedule it so that the strong language that might be used would not be heard?

KLEINKNECHT We certainly wouldn't schedule anything around language. We'll tape the language, and if they can do a good job, I could care less about the language. But, I believe, seriously we will try to schedule it when we have maximum ground coverage. That's only good common sense.

QUERY You said that the mission might be extended if you don't get the solar, the other wing on. If you don't get the wing on. If you do get the wing on, is there a possibility of also extending it.

KLEINKNECHT I didn't say it might, I said we are studying that. We're investigating it. I intended to say we have not ruled it out. It's not as important to - If we get the wing out, we can start getting more data right now. Let me back up again. Just getting the wing out

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doesn't necessarily get us out of the situation we're in. We have to get it out, and we have to get power out of it. If we do that, we'll have power to do the experiments, so we won't be losing that 8 days after their cryos are exhausted in the CSM for the fuel cells.

QUERY So then, if you get the power from the wing, you probably would not be considering -

KLEINKNECHT If I could predict the future, I wouldn't be here. That far in advance, with the situation we have, I wouldn't be here, now. I don't know. We'll certainly consider everything that we believe will benefit the program. And we're making decisions on a day to day, and sometimes hour to hour basis.

QUERY Can you - you said if they went into an extra 10 days, it would be a night recovery. Is there a cutoff period within that 10 days when it would still be a daytime recovery? At 8 days you could still do a day recovery? Is it just extending past 28? Do you have -

KLEINKNECHT I don't know that off the top of my head.

QUERY Depending on the earlier SL-3 launch. This means accelerating the crews training, doesn't it?

KLEINKNECHT To a certain extent, we had been trying to train all three crews together and get them trained for their missions by the time we launched Skylab 2, and the idea was to have the time thereafter to modify training and procedures and so forth based on the experience up there, so, we don't believe that that's a serious problem. We believe we can train them. We will not be taking any shortcuts in training. We also plan that the test flow and checkout at the Cape will not be compromised in any way. We have made a decision that we will not do a dry CDDT, which is about a 24 hour test. It was not a test, I'm sorry, I shouldn't call it a test. It's more training. It is the time that the crew gets all suited up in their flight suits, and they can verify all the interfaces, their interfaces with the vehicle. We believe we can do that - accomplish fully the intent of that in the simulator one-g trainers. We did do a dry CDDT, Pete did, and his crew We had no problems with it. The other thing that you get during that is you bring the whole launch team together, and they all work together. I don't believe we've ever had a smoother countdown than we've had on Skylab 2. So, we don't think that's any problem to delete that 24 hour activity.

Query I wasn't at Dr. Petrone's news conference yesterday and this might be a little redundant,

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and if so I apologize, but what is the status now of the batteries and CBRMs and have you made any progress toward any possible fix?

KLEINKNECHT As far as I know, it's the same as it was reported last night, change of shift. I don't think there have been any changes today.

PAO Any further questions.

KLEINKNECHT And at the change of shift tonight, I'm sure the flight director can give you a more current, accurate status than I can, in detail.

PAO No further questions, we adjourn.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Shift Briefing
6-2-73

Change of Shift Briefing
Johnson Space Ce
June 2, 1973
8:45 a.m. CDT

Participants:

Milton Windler, Flight Director
John E. McLeaish, Public Affairs Officer

SL-II PC17A/1
Time: 08:50 CDT
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SPEAKER Okay, why don't we proceed to get started. I do understand we have a number of press in remote locations listening in this morning, and, hopefully, we will generate some questions so that they will have something to listen to. We have with us today Milt Windler, who is the flight director who has just come off shift. Why don't we open with Milt's summary and then throw it out for questions.

WINDLER Okay. Well I don't have any great revelations. I spent part of the night watching the TV program that I guess y'all saw earlier yesterday - very impressive, I thought. The plan for the day is to do an EREP pass and it's the same one I described a couple of days ago, I think, to you that comes across California and on in to Mexico. We do plan to get some TV of the EREP operations. We'll also do some ATM TV work. And other than that, it's a pretty straightforward day. I don't believe - there's not a great deal of medical activity today. Tomorrow we are planning another EREP pass. It's over a similar part of the country. It goes through San Francisco though, instead of down towards Los Angeles. We plan to continue running the S183 experiment, and we'll do M092-171 run on the - one of the crewmen. I'll look outside and see who it is in a minute. And we'll also get some TV of that. The day after that, we'll be looking at a calibration rocket. The ATM experiment - it's associated with a joint effort with a calibration rocket fired from the White Sands Missile Range. The spacecraft continues to cool off a little bit. I think we're down to 78 something or another, point something or another. And we really haven't had - we've had some small anomalies in the spacecraft. Got a CAUTION AND WARNING on the OWS buses, although we went back and reviewed the data and couldn't see anything actually on the - any change in the bus currents or voltages. And we're still looking at that, but we, right now, don't attach any great significance to that. It could have been some spurious signal. The electrical power system continues to operate pretty normally. We didn't, of course, run any experiments yesterday, and we haven't really had any problems with that in the last couple of days, since we had that other battery failure, or regulator failure. And that's about it, I think.

PAO Okay, why don't we take questions now. John Wilfred.

PAO No, the other end.

QUERY For the EREP pass this afternoon, do you have any - what kind of special instructions have you given the astronauts as far as ways to conserve energy or electricity? Are they turning down all the lights and things like that?

WINDLER Yes, they are. And I doubt if I can even recall all of the instructions. Our normal procedure is - we run some heaters in night time, when the crew's not awake, to

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warm up the MDA, the docking adapter, to get the temperatures up in there and prevent condensation and things like that. And then we don't do anything during the day, et cetera. So we sort of cycle through the load requirements. And the caution and warning system - part of that is powered down when the crew is awake. These are things we instituted a couple of days ago, and they are sort of standard procedures now. As far as the EREP pass itself is concerned, we have some options available to us that we would use if we had to. We could turn off, for example, the ATM thermal control system for a relatively short period of time like, you know, get us through the backside cycle for 30 or 45 minutes with no real problems. And that would gain us perhaps 150 or 200 watts. So those things are available. There is some parts of the environmental control system that we can turn off for brief periods of time, and we will do that.

QUERY Milt, could you explain a little bit about the battery situation as to whether they are or they are not taking a discharge, or taking a charge rather - and know what they're doing with discharge, and maybe go back a little bit into some of the history of this? I realize that some others have already gone over it, but I - it's really not too clear in my own mind.

WINDLER Well, I guess, in summary, the batteries are supposed to be worth around 20 amp hours and - which, of course, as you can discharge them to a level to 20 percent of that or down to 20 percent of that 20 amp hours, and then they automatically trip themselves off the circuit so as not to completely discharge. And this is sort of a safety valve that allows you to turn the battery off the line at a point where you can still recharge it and get it back up to its full charge again. And this is - they have been cycled many times, and they have been, in some cases, cycled down low in the depth of discharge. And there is some indication that instead of being 20 amp hour batteries, that perhaps they're something less than that - 10 or so, some lower number. And what this means is that after we take a smaller amount of amps out on the backside, then we get these battery disconnects from some of the batteries. It's not from all of them. And the phenomena is - we don't exactly understand about it. We don't know how it relates to the current drain and things like that. We think it's a function of the higher current drain since - of course, you know we would have two sets of solar arrays, and the load on these batteries would be approximately half if we had both power systems going for us.

QUERY So the other day when - perhaps when some of those tripped off at 45 percent or so, it really wasn't 45 percent. Maybe they were down closer to the 20 percent. Is

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that what you're saying?

WINDLER Well, I don't know how you - you can look at it two ways, I guess. It's 45 percent maybe of the nominal, but we no longer have a nominal battery; so maybe we were down actually to something like 20 percent of the new rating.

QUERY You don't think this could be any fault - you might not have been given substandard batteries in the beginning or anything like that? Or might you?

WINDLER I don't have - we don't have any reason to think that we were. No.

QUERY They checked out as 20 amp hour batteries?

WINDLER Yes. They've been through a lot of testing, and they've worked well in the testing. Now we've been through a power profile that has been - that they were partially tested to. I don't think - and you'd have to ask probably a battery expert for the details to the precise or the exact testing that they went through. But they have been through a cycle similar to the one we put them through. But as you're well aware, the exact temperatures perhaps that they've been exposed to are not - you know, we're not real sure of it. So there could be some factor there. This is the thing that the folks at Marshall are still trying to work on and trying to validate. And I really didn't get any update information since yesterday on how that testing is progressing.

QUERY Have you gotten any new information on the plans? I realize - I don't guess your team does the actual planning that far ahead, maybe it does, I don't know. But anyway on the possibilities of the EVA to jerk out the solar wing?

WINDLER Well, we would be doing some of it - if we knew when to schedule it, and we don't yet. And we're going to do that as soon as we can. And I think everybody anticipates that that might be not - you know - not too many days from now - less than a week, something like that.

END OF TAPE

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WINDLER And we don't yet. And we're going to do that as soon as we can. And I think everybody anticipates that that might be, you know, not too many days from now, in less than a week, something like that. And our plan is - whenever we are sure that we know what to do, then we'll put it on the schedule. And we'll probably - you know, we may even (garble) a schedule. Like right now, we've planned - tenative plans are today 155, which is two days from now, but it will be no big thing. If we knew what to do right now, for example, to change that and make 155 an EVA day instead of an EREP day, that would be no problem at all. We - but the first step is to find out exactly what we need to do, and that's what the people are working on now.

QUERY The other thing I wish you'd do for me is explain what a Beta angle is. I gather it has to do with the amount of time (garble).

WINDLER You wouldn't believe this, but I never understood that myself. It's actually the difference in the angle between the orbit plane and the plane that the Sun is in. And at certain times, they happen to coincide, and we're going towards those now. But we're flying at about a 13-degree roll angle, you might say, to the orbit plane, in order to have the Sun shining full on the solar cells.

PAO Do we have any other questioners?

QUERY Yeah, I just wanted - Would it be correct then to describe the Beta angle really as - as that part of the orbit in which you get the most sunlight?

WINDLER No, the amount of the orbit that's in the sunlight is a function of the Beta angle, yes. And that's the reason that I think you're asking it better - because of its relationship to the power. The more sunlight, the more power we have, obviously.

QUERY You mentioned calibration and rocket firing from White Sands on Monday.

WINDLER Is that when day 155 is? (Laughter)

QUERY I think you said Monday.

WINDLER I said 155. And I tell you the truth, I'd have to add it up to know what day that is, but - Sunday, Monday, yeah, okay.

QUERY What kind of rocket is it; what is its function?

WINDLER Oh gracious. My mind is blank on the kind of rocket it is. I must have been told that fifty times. But its function actually is to, to - basically it's a calibration. It's a ground attempt to calibrate on features on the Sun and to tie these into the observations on board the spacecraft. So we actually get data back from the sensors on the rocket. And then

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we use that information to tell the crew exactly where to point the ATM instruments. And then we have then another, a high altitude you might say, calibration of some of the features on the Sun to compare with what the ATM instruments are giving us.

QUERY Would this be an Aroby Rocket or something like that?

WINDLER I don't know off hand, but I'm sure we can get that.

QUERY Okay. But anyway it's a relatively small rocket - -

WINDLER Yeah, it's an atmospheric shot; it doesn't get - no, it does get above most of the atmosphere. I mean, you know, where do you draw the line? It's a high altitude rocket, and that's the purpose of it, in fact - to get above the atmosphere.

QUERY Sensors on board - what kind of sensors are they? What are they looking for? Are they looking for some disturbances on the Sun, and they know where to point?

WINDLER I guess I can't answer that very well: so I better not. I could find a - It has been explained to me, but if I tell you what I think it is, I probably would get the explanation fouled up in trying to repeat it to you.

QUERY Could we get something on that later, John?

WINDLER Yeah, we can.

QUERY Milt, what's the status of the testing over at Marshall?

WINDLER On the wing deployment? I think they're through, actually, there. And have come back here now and are trying to figure out the exact procedures to use. It's my understanding that all the people that were there are back here now.

QUERY Rusty included?

WINDLER Yes.

QUERY And the program people?

WINDLER I don't know whether all of them are back yet, but some of them are.

QUERY Is Schneider back?

WINDLER I don't know where he is.

PAO I'm sure we can find that out also.

WINDLER Yeah.

PAO Do you know, Howard?

SPEAKER He wasn't in our meeting this morning. Somehow I had the idea he was in Washington. But I --

QUERY Do you have any feel for how it went?

WINDLER Well, yes, we got - I probably can't answer your question very good. We got the information that we needed, and it's a case of putting together the procedures that we need. I really can't tell you what they are or what they're likely to be yet.

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QUERY How long, after those procedures are put together, would it take for you to develop a Flight Plan? I mean from - as a - you know, a function of just getting the MOCR set up for it and everything?

WINDLER Well, I can tell you in terms of hours, but it would be that kind of a thing, because, of course, we already have procedures set up for the EVA, and to get the film there, then we would be using the same hardware, the same hatch, and etc. So it would be a case of getting the procedures written down for the actual cutting operation or prying or whatever it turns out to be and identifying the tools and so forth and getting them to the crew and probably discussing them with the crew. I would think there would be some period of time for them to think about this and to respond. And that would probably be - the longest time involved would be in getting their questions answered. But it - there's not any - I wouldn't think there would be anything more than a couple of days. I think if you had the procedures right now, you could even come close to doing it tomorrow, for example. But we don't have them now. It would be a case of getting them typed up and sent on a teleprinter and the crew looking at them and answering the questions.

PAO I'd like to sum up what I think I know about these batteries and have you tell me if I've got it straight or not. The - First, they seemed to have suffered some from getting warm while they were outside during the unmanned phase. Is that right? Is that what you believe or suspect?

WINDLER Well, it's a possibility, I guess I'd have to say. I don't think we have any real engineering data, unless it's happened in the last day or so, that - that says that that's the case other than the fact that we do know that we were in a high thermal. You know they did - were subjected to heating now. We didn't really think that would affect them, but obviously that's a possibility.

QUERY They weren't too hot, were they?

WINDLER I think it was 28, 29 centigrade, which is 84 Fahrenheit? You're right. The instrumentation that we got on the batteries indicated that they should have been within their limit. That's correct.

QUERY And whatever caused it, their capacity has been reduced. They can't hold as much current, to put it a little too simply. Right?

WINDLER Yeah. Some of these batteries - that's right. Not all of them.

QUERY Do they also charge somewhat slower than they were supposed to? Do they take a charge a little more reluctantly? Some of them at any rate?

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WINDLER I don't think so. I haven't heard anybody say that they did, and it doesn't look like it, just looking at the data as it goes around.

QUERY At any rate, the pool of power you have available to draw on, although it varies from - goes up and down, is smaller than it was supposed to be as well as being replenished more slowly, because you've got less capacity to collect solar energy. Is that correct on both counts?

WINDLER Yes, you're talking about - those two things are separate problems, but, yes, that's true.

QUERY Right. Thank you.

PAO Any further questions?

QUERY On the - again on the batteries. Is what you're saying that - that really what effect you're seeing appears to be more from having the ATM batteries holding all of the load, instead of sharing the load with the orbital workshop, or as originally planned? You know, because of the non-deployment of the solar array on the workshop?

WINDLER That's probably got something to do with it. That's one theory that the battery folks have. Actually, we'd be better off if you have detail questions on the batteries. I'm not in a very good position to answer them, and the battery experts are the folks from Marshall. And I wish I'd known that y'all were going to ask all these questions, 'cause I'm afraid that I'm not answering them very adequately. In fact I'm sure I'm not. But it's sort of like if you wanted - if you had to take 10 amps through the battery or if you had a 10 amps, you know, load, and you planned on taking 5 of it out of the workshop and 5 of it out of the OW - I mean out of the ATM power supply. And you're going to do all this during the roughly 45 minutes that it's behind the backside of the earth. So the time is the same, but instead of taking 5 of it out of each battery, you got to take 10 of it out of the same battery in the same time; so the discharge rate is higher. And that may have, you know, an effect on the capacity, even though we have not - did not exceed, supposedly, the primary factor, the depth of discharge. We didn't exceed that, but we got to it in some cases, you know, quicker.

END OF TAPE

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WINDLER - though we did not exceed supposedly the primary factor - the depth of discharge. We didn't exceed that but we got to it in some cases you know quicker, so that may have something to do with it. Like I say, there's other options or other possibilities, rather, and these are all being run by Marshall and I really didn't ask anybody to discuss - the status of their testing in the last day so if you really want to get an in depth answer on that it probably would be better to ask somebody from the Marshall office to come over.

QUERY Milt, would you run over the EREP thing tomorrow again. Ground track that's going to be covering targets?

WINDLER It kind of comes down from San Francisco and goes down oh roughly across Baja, California the Salton Sea area, a little bit west of there, I guess, really or east of that rather. The one today is through Los Angeles and the Salton Sea. The other one is a little bit to the east of that track.

QUERY Do the battery people tell you - from what you said to Art a minute ago you're charging and discharging the batteries more than you thought you would have if you'd had the whole array including those for the OWS, so the batteries are going through more charge - discharge cycles, aren't they. Is the fear that that will shorten their life?

WINDLER No. The number of cycles is the same because they are always intended to be charged on the front side when the solar array is there and discharged on the backside so that hasn't changed any. But the power is being supplied half of the number of batteries, even though we're using less power but even so we're - so that the, you know, the rate of discharge is so high.

QUERY I misunderstood there. But I still want to know, do you fear that what is happening to them will shorten their lives?

WINDLER Yes. We are concerned about that. And that's why we're trying to understand better what it is that's happened to them and what the status of the battery is and we need to understand if there is anything that we're doing that's aggravating the situation, we want to stop doing it. And, in fact, we're trying to be conservative now in our approach to the power management until we do find out these answers.

PAO Do you have any further questions?

QUERY I was just going to say - and you mentioned there were 4 of those batteries, I think, that are not taking or that are -

WINDLER There are four that appear to be somewhat lower in capacity than the others.

PAO Any further questions? No further questions we'll adjourn.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 1, 1973
6:45 p.m. CDT

Participants:

Don Puddy, Flight Director
Richard H. Koos, EREP Officer
Milt Reim, PAO

Shift Briefing
6-1-73

SL-II PC-16A/1
Time: 18:45 CDT
6/1/73

PAO Let's get started here on my right, Flight Director Don Puddy, and on his right Richard Koos, K-O-O-S, the EREP officer. Don, take it away.

PUDDY Okey doke. I guess the most interesting thing that we had today, you're taking a look at it on the screen over there, is the live TV from the spacecraft. And I'm sure you got a real good feel today of how much the crew was enjoying their day off. And also got a real good feel I think from the standpoint of how well they had adapted to the larger environment, which was a question that everybody was faced with before we took off on this mission. They seem very happy and in excellent spirits today and I think that was evident to everybody. From a thermal standpoint in the spacecraft, we're running about 79-1/2 degrees today, still dropping slightly. So we may get lower than the 80 degrees that we previously had anticipated. Electrically today we had loads that varied any where from around 36, or 3700 watts on up to a high of 4400 watts. Had no problems whatsoever. In fact, the spacecraft performed beautifully today. The M487 experiment that we briefed you on last night was fixed. I'm not sure just exactly what was done to correct it but anyway they did take some sound readings in the spacecraft today. And they all sounded real well. We do have, we did develop our flight plan today for tomorrow and it does include an EREP pass. And let me turn it over to Dick for just a minute here, and let him describe to you the path that that EREP data take is going to have for tomorrow.

KOOS The pass itself starts at about 4 minutes after 3:00 tomorrow afternoon. It's a 10 minute pass. It begins about 5 minutes before it crosses the west coast. And it will cross the coast over the San Francisco area, and come along the edge of the coast down through Mexico. And it will end about 18 degrees north and about 100 degrees west longitude. It will end about 100 degrees west and about 18 degrees north. It's in Mexico, I don't know exactly what town or anything like that. Just to give you an idea, last night, based on weather forecasts for that area, we expect to get in the neighborhood of about 25 test sites coverage during that pass. And they're doing an evaluation on today's forecast, and that may alter, I think that the clear weather is a little bit smaller than it was forecast yesterday.

PUDDY Okay, as far as the remainder of the day, it is a filled up experiment day. We have in addition to the EREP pass which takes place in the afternoon, we do have 6 daylight ATM passes. We also have a medical run,

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in fact we have 2 medical runs. One M092 93 run and a M131 run on the Commander. We also are taking the S019 experiment that you have been briefed on out of the SAL and putting the S183 experiment into the antisolar SAL. This is another star experiment, UV stellar astronomy-type experiment. We'll be running that early in the morning. And that's basically the plan for tomorrow. One other thing that I might add is we are doing some additional calibration data on the small mass measuring device. This is the device that you may have been briefed on. It is sensitive enough to weigh a postage stamp. And we are moving the electronics on that particular package and then we'll go through a recalibration - -

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PUDDY -weigh a postage stamp, and we are moving the electronics on that particular package and then we'll go through a recalibration sequence, and that will be done tomorrow. As far as the long range plan, over the next five days we expect to accomplish four EREP passes, continue on with our medical protocol, also continuing on with, of course, as much possible time as we can give to the solar physics or the ATM viewing. The next scheduled crew day off is day 15, and of course, we're still planning on a 28 day mission, and as probably as you've heard announced today, we're looking for a Skylab 3 liftoff on July 27th, I believe it is. And with that we open it up for questions.

QUERY What are some of the sights that the EREP experiments will we be picking up on?

KOOS Probably the ones that we'll be most interested in are the ones that the crew will be tracking. The San Francisco area is the one, the first one that they will pick up. There's another one on Salton Sea. We'll cross right over Salton Sea in Yuma. And that will be the other site now. We're restricted in how close we can put these together. I think those are only two that we have in opportunity to track tomorrow.

QUERY On these sites, and then all the 25, if most of them are inconsequential, what are the exact things they're going to be looking at? What are they going to be studying? Are they gonna go the whole gammit or what?

KOOS Yeah, there is quite a variety there. I wouldn't say they are inconsequential. I just gave you the ones that are probably of interest, because the crews participating and actually tracking them visually. They cover all the range of diciplaints.

QUERY Will this be a full, what they call a 120 degree EREP pass.

KOOS No, its total arc is 40 degrees, centered around orbital noon.

QUERY Were we doing a 120 degree EREP pass the other day when we lost the batteries for awhile?

KOOS No, it wasn't that large. I think it was about 70 degrees. Seventy degrees of arc.

QUERY You have full confidence, then that you won't be out of plane long enough, that you'll have any problems at all with the batteries, because I know those four could go out again if you get down to that 45 percent.

PUDDY Let me comment on that briefly. Basically how we're working the electrical power work right now, is that we do develop a, what we call a summary flight plan. Subsequent to developing that, And I've more or less briefed you on

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the level of detail that is - it just merely lays out the experiments that we expect to conduct at a particular period of time for all three crewmen. And, of course, each one of these experiments has their various loads. EREP load happen to be very high. And basically, what we're doing is after we have completed a summary flight plan, we run a detailed electrical analysis of that flight plan, determine what the depth of discharge or the state of charge, however you're familar with looking at the battery state, for that particular flight plan and determine if there are any problems, and if there are electrical problems that - from the standpoint that we're getting too high and our load for too long a period of time, we look at various equipment that we don't need. Like I said today, we ran anywhere from around 36-3700 watts to as high as 4400 watts and a lot of that, as we talked about last night, can be attributed to such things as lights and extra cooling and things like that that can be powered down. And we have developed a couple of power down checklists that we do use just prior to going into an EREP pass. So, as far as giving you all the details on tomorrows flight plan as to exactly what the lowest state of charge or lowest depth of discharge on the batteries that we expect to achieve, I can't - That information will be available in about an hour or an hour and a half. But, I feel very confident that with the pass that we're talking about tomorrow, there will be no problems.

QUERY Is this pass that we're calling for tomorrow, is it - has any changes over what was planned premission for say track 63, is it the same length of time, same instruments and everything else, or has there been modifications because of the power.

PUDDY I think that the - Let me answer that one. I think that we're going to find that in general, the EREP passes, because of electrical power considerations, are going to be somewhat restricted in the overall arc, due to electrical power considerations. However, that doesn't necessarily imply that the data that we're gathering from those passes is going to be any less. It so happens that looking at the weather conditions as they stand right now, and correct me if I'm wrong on this, Dick, that the weather appears very good, and we were doing some simulations prior to the start of this mission, using actual weather. We were running anywhere from 70 to 120 degree passes, and coming up with maybe 14 sites, and we're talking about a lot more sites than we expect to get tomorrow, with essentially the shorter pass that Dick has briefed you on. So yes, in answer --

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PUDDY And a lot more sights that we expect to get tomorrow with essentially the shorter pass that Dick has briefed you on. Yes, In answer to your question, they are a little shorter due to electrical power considerations. We may gradually lengthen these things out as we get a little more experienced, little more data. But at the same time I don't think this has imposed upon us an undue penality into what we expect to get back from the Earth Resources experiment package.

QUERY I'm not quite satisfied with what you said about the test sites. Why are you looking at San Francisco. you studying there and how about the Salten Sea?

SPEAKER Well San Francisco is an urban area and that's basicaly the study there. The Salten Sea is an agricultural type site. San Francisco also is the bay area. It's a waterland interface. Actually those are alternate sites. There are other objectives. Houston is one, the urban areas. San Francisco happens to be an alternate to that site. There's a site that's located in Rosenburg which isn't an agricultural site which Yuma is a substitute, or an alternate.

QUERY Are you looking at any particular crops for any specific reason or ...

SPEAKER Not that familiar with as many of these sites for tomorrows passes.

PUDDY Let me add a few comments here. Basically what we at NASA are doing is - as far as EREP is concerned, we have been working with the principal investigators. They have come up with a particular site. There had been some ground data. There may also be some aircraft over flights. And basically what our roll is here is kind of two fold. We are looking at developing the capability of perfecting some sensors which have the capability of accomplishing certain objectives in space from an Earth Resources stand point. But as far as the actual data analysis and subsiquent application of that data, this is something that has primarily done by the principal investigator. So our primary job is merely to work with the principal investigators to find out which sites they would like to view, which instruments in the package they would like to use to view that particular site and if they do have aircraft over flight requirements to assist by using NASA aircraft in scheduling those aircraft to be over those sites within a certain time frame of the spacecraft pass and then to provide them the raw data or in some cases reduce the data according to their specifications. As far as the detailed analysis in just exactly what they can use that data for from an application stand point. That responsibility pretty much lies with the principal investigator. I don't know whether that helped clarify it for you but . .

Press Couple of points on a rather lower intellectual level Did they get those showers done today?

SPEAKER Well we know they got a couple of showers done. We tried to ask them about the Saturday night special

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SPEAKER there but we were unable to get any comments back. I've been expecting any minute they were going to come up and tell us just exactly how nice it was to have that break but as yet they haven't commented. We did quiz them on it. But we didn't get any comment back.

QUERY And It would be a help to know - for the purposes of recording it and so on tomorrow What - if any plans are there for Conrads birthday?

SPEAKER Well, I'll tell you, the only I have taken is one associated with a wake up call. And there will be a rather unique - for a spacelight wake up call tomorrow morning. He will rapidly get the idea that we remembered it's his birthday.

SPEAKER Right.

QUERY With all their gyrations today and their running around and moving around inside the spacecraft, it that causing any problem. I think there is one test isn't there, one experiment to see if their motions effects the stability of Skylab.

PUDDY Yes, those are - we do have test like that to see whether their motions does effect the stability of the spacecraft. But as far as that causing any problems I'm not sure I understand exactly what you mean. We did notice the movement in the spacecraft today when all three of them were running the foot race around the food lockers or the lockers in the upper end of the dome.

PRESS It doesn't cause any impact at all - You don't have to compensate in any way?

PUDDY No, no, ... the system takes care of itself. The crew has been cautioned on and trained to that there are certain experiments which do have a degree of motion sensitivity as far as the overall spacecraft is concerned. And during .....

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PUDDY - - certain experiments which of course do have a degree of motion sensitivity as far as the overall spacecraft is concerned. And during those time frames the crew isn't zipping through the spacecraft or running foot races or that type of thing. But as far as it causing any problem in gathering the experimental data on a normal day, it has not shown up as a problem.

QUERY I had heard that they were having to use some extra TACS gas to compensate.

PUDDY No, we have not, let me think back. The last time that I am aware that we used any TACS gas was, we did use a little during the maneuver, the EREP maneuver, because we did have, if you remember, one of the rate gyros we did have a failure there. And we did have a couple of firing there. And the previous time to that was associated with damping out the trim burn, which we expected. We had no TACS firing today. And none since those two cases. So, we're not using TACS gas there.

QUERY Sir, has there been any more talk this afternoon, since 3:00 I believe we heard the last, on the possibility of extending Skylab II mission beyond the 28 days?

PUDDY Oh I'm sure a lot of things are being considered. As far as any official extension of the Skylab II mission, no. There has not been any decision reached in that area. The only decision that has been reached is the July 27 liftoff on the Skylab III or a date as soon as practical thereafter.

QUERY I believe I heard Paul Weitz, maybe it was yesterday, say that part of the ATM had turned yellow, it was off-color.

PUDDY Yes, he did indicate that one side of the spacecraft had some yellowing to it and the other side of the spacecraft on the ATM was what he described as very clean and white. As to exactly what that's attributable to, I can't really say. I can only surmise that it probably had something to do with the overall thermal conditions that we had to put the vehicle to during the early part of the mission. But as far as the ATM portion of the spacecraft, we certainly have no reason whatsoever from the performance of that equipment to believe that yellowing is having any degradation in the thermal coatings on it. All the ATM instruments have been well within their temperature bands, which are very very close. There has not been any problem that I am aware of.

QUERY Do you ever notice any clouding of telescope lenses?

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PUDDY Oh no, no. In fact from the - I haven't had a chance to go back and review in detail some of the data we have been getting back off some of the ATM experiments, but I did glance at some the other evening and the PIs were very jubilant. I'm sure if there were any coating on the lenses we would have heard about it.

PAO One more question.

QUERY Well, I'll ask the main one then, I had a couple. One is very short. Does that 4 EREP passes in the next 5 days include the one Saturday?

PUDDY Tomorrow is Saturday and that is correct.

QUERY What can you tell us about this problem of the batteries taking a charge that Rocco Petrone and John Disher were talking about today, Petrone especially? Have you got any data on how serious it is? What have you been able to get together?

PUDDY Well, I don't know exactly what they said. I guess the best way to phrase that is that you expect - when we lifted off, we expected each one of these batteries to have a certain rated capacity. And what we have found out is that it looks to us like right now a few of these batteries do not have that rated capacity. Therefore, since they do not reach their full rated capacity, during a charge cycle, you basically have the problem where you reach the lower limit on the states of charge during the nighttime frame much earlier than predicted. And of course this is just another aspect of the overall electrical power management that we must take into consideration.

PAO All right, thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Briefing on MSFC Activities Supporting Skylab
Johnson Space Center
June 1, 1973
3 p.m. CDT

Participants:

Dr. Rocco A. Petrone, Director of Marshall Space Flight Center
Guy Jackson, Public Affairs Officer, MSFC

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SPEAKER Are you ready?

SPEAKER This is the first in a series of briefings in which NASA hopes to have some of his top management personnel available to the media. The Marshall Space Flight Center is responsible, as you know, for providing the Saturn launch vehicles and a good bit of the Skylab hardware and some of the experiments. So for this first briefing we have Dr. Rocco A. Petrone, R-o-c-c-o- A. P-e-t-r-o-n-e, who is director of the Marshall Space Flight Center, who has been the director since January 26, 1973. Formerly he was the Apollo Program Director for NASA in Washington. There are a few biographies available at the news center after the briefing, but Dr. Petrone is not interested in history I know. And there's a good bit of activity going on at the Marshall Center right now in support of Skylab, so Dr. Petrone may want to make an opening statement or summary of that, and then we'll have questions and answers. Dr. Petrone

PETRONE Okay. Let me summarize some of the work we're doing at the Marshall Center on the aspects of freeing the SAS wing that's still attached. Obviously we've given it a very high priority, you know we attempted it when we first got there. We would still like to do it. We've had a effort going underway every since we took the first TV pictures. We've been enhancing those, trying to see just how it's angle of aluminum is attached to the honeycone. And there's been some enhanced pictures which bring out a little more detail. And we've been looking at methods by which the crew could approach the angle - I would like to say angle iron. It's really angle aluminum, angle iron kit comes out in mind, approaches from what would be the fast station. That's the forward air shroud. He'd come out the EVA door, like we would for a normal EVA, you have to work yourself around to in wing - SAS wing 1 which would be on the right as you look at it.

QUERY Would you point on the model (garble)

SPEAKER Okay. You see the hole in the meteoriod shield is a solar airlock.

SPEAKER I don't know how this is going to stand up (garble)

SPEAKER It's fragile I know. Wings do fall off easily.'

SPEAKER Not intended as a pun.

SPEAKER That's what bothers me the most, it's not mine. I want somebody to get on the train with me.

SPEAKER We wouldn't do that, Jack.

SPEAKER Right here is what we call a subsolar point. This is the solar airlock in which the parasol is

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now deployed. Wing one is what I call looking at it to the right, if I'm heading head on looking at ATM in the subsolar point. This is wing 1. The EVA station is up here. He's got to work himself around to that point. It's not a normal station where he would have to be. Now what's being looked at in Huntsville, we've got Rusty Schweickart working with some of our test engineers, is first how would one tether himself to get out there? What would you do? One method being looked at is using some of the poles we have for the tools and the sail, 5 or 6 poles to put a - attach it here on one of the ATM frames and then - possibly that shepherds hooks. You know the shepherds hook we took with - find a spot down below in the beam to tie, and in fact make yourself a handrail that way. Another one being looked at is the use of this - a thing called a flexible fireman's pole? It's what you've seen in the ship, they had going down the length of the workshop. That could be taken out and a possibility of maybe using that as a - as a tether. Right now the poles, with the shepherds hook to be attached into the beam and then tied up here, is one of the methods of having a flexible handrail. The guy could work down - one of the men - the crewman, and also attach himself to the tether. The cutting schemes we're looking at - cutting or prying, I should say, but getting it loose there're three. One is a device called a bone cutter that I think you've been briefed on. It's a pretty bity tool. In 1G they're able to cut it very fast, less than a minute. In the water, it took longer, took three minutes. But one must be very careful not to - -

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SPEAKER And it's a pretty bity tool. In 1 g they're able to cut at a very fast, less than a minute. In the water it took longer. It took 3 minutes. But one must be very careful not to infer those times with what we can do in zero g, because he's got to get himself in position. And that's the whole angle we're looking for here. It's where in he can get a position that we would consider safe. In terms of the micrometeoroid shield on one side and where the beam will go on the other. But the bone cutter does cut. And it cuts that metal. And we've taken a look at some of the worst case pile up of a little bit of the meteoroid shield. And if he can get around it, he can cut. Now, of course, the question is can he get around it. From the enhanced TV pictures, it appears there's some sunlight shining in one of the views under this angle aluminum. From that, Rusty has concluded and our people with him, is that, yes, we should be able to slide this under. But, obviously you won't know that because shadows have got to be deceptive up there, we understand. So we're looking at more than one way to cut. Another way is the bolt cutter. That's the one we did fly up. It's on board. That's the one that you activate with a lanyard, you pull on it, and the use of that. The third device is the use of the pry bar. Pete Conrad, seems to believe in discussions that if he can only get those rivets loose, the thing would easily swing out of the way. So, we're looking at three schemes to get the angle aluminum loose. The bone cutter, the scheme which you would slip under and then pull. But, that needs a fairly good position to anchor yourself. The bolt cutter which we feel we could position in a certain way, then a man up here might pull the lanyard. He's in a better position up there. He could pull. And the third would be the pry bar to try to get those rivets as they appear to be in the picture out of the honey comb. Okay. I've discussed then, one getting down there by tethering. Either poles, or this flexible fireman's pole, but the pole's looking right now the most promising. The scheme by which we would cut or fray. And now the last thing that we would have to do, would be to ensure the beam comes off. We have reason to believe the beam is ah - is a damper actuator. The damper has oil in it, and is quite cold. We're still reading temperatures in this thing. And we see a temperature in here which, you could say the oil is like molasses or maybe frozen. And we've therefore, got to put the force on it. We had estimated the force at the bottom to pull that up would be like 10 pounds. As one gets closer up in here, the forces are going up. We think it's about the spot in here somewhere. They've worked out the two ways to do it. Now just take, the guys are really thinking and you've got to give them credit for it. Some of

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these, as we work further, may pan out. But one is to use the wash cloth squeezer. I don't know if you've heard that one yet. There's a squeeze bag onboard in the system, in which, you're able to wring out wet items, like a towel or cloth. It's a flat bag, not much - a little bigger than this, you can slip it under there, then if we can pressurize it, we can put a force under the beam. Now we've done this once in one g tether. The question of what kind of pressure we're talking about would be a low pressure like 10 PSI. There's some lines onboard we can do this with. Clearly one wants to make sure and all that these things will take the pressure. The bag will. The bag has been proofed to 10 PSI. Actually, burst much higher, about 40. But the question, what connection one would make, where one would tie in. But I've got to give them an A for credit. It's a very novel scheme. It'll be one of the easiest because once you cut, you could slip it under right at the hinge line, go back up here and pressurize it, and hope to see that beam spring up there. Another way, and one that we're going to be trying, I'll talk about later this afternoon, is use of this fireman's pole. What the fireman's pole is, is really flexible webbing. You see the men working up and down on it in the tank. They had it out I believe the first day.

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PETRONE The one that we're going to be trying to talk about later this afternoon is use of this fireman's pole. The fireman's pole is really flexible webbing you see the men working up and down on in the tank. They had it out, I believe, the first day. This is webbing with a metal hook at either end. What wa envision is to take one hook, tie it in - there are three vent areas on this SAS beam; hook it into the one midway. The beam now would still be free (Suppose you got it, for you're either cut or pried it loose.) but still down by virtue of this damper actuator being either frozen or very gooey. You put one end of the webb material with a hook under a vent - I think you saw the vent in the pictures - the TV pictures. You may when we were looking. It's like a covering. It's a hood. It's intended to vent this on lift-off. Put one end under here. Another end would be tied up there, and leave just a little slack where the astronaut could get under it. Then he would stand up against the ship, and that would then pull the line together. You could imagine this line tied at either end, fairly taught, but enough either he could pull it or get it over his shoulders in the half crouch and then just stand up. And that would put force, sufficient we believe, to pull the beam out. Now that second item, that one there - we're doing a 1-g walk-through right now with a full beam on the floor. We've tested the hook - what it'll take. One of the key items is how you attach that hook to the vent covering; clearly, you want to get structure. And that's one of the reasons we have shipped from TRW the wing into Marshall, I believe it's arriving in about an hour this afternoon - so we can actually see the as built condition of where your strong points are. We've been working with simulator gear, and we want to actually get the actual hardware so you know where you grab. And you can caution them where to put the hook and the exact things from a beam built to fly, which is the one we're getting flown in this afternoon. So we then have two ways to free the beam we're now looking at. Of course, there's always - say another is tc - you wouldn't like to do a SEVA, but you could fly with the ship and pull it, if you couldn't get these other ways. And we certainly want the power. So if we can free that item, I would think that's first priority. It's either cut or free that angle. Once we've done that, I think the rest of it then - if these two systems don't work, we'd certainly know that a fly-around by the ship or the shepherd's hook - we could definitely put the force, because the other night, when Paul Weitz first tried it, he deflected that beam about a foot. He deflected the beam - In a transcript I read, Conrad mentioned that the beam had come out. Be it very clearly at the end where it was attached, it hadn't moved. So there was quite a bit of force put into that. So this afternoon nw, we're in the process then of using

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this - what they call the fireman's flexible pole on a 1-g mockup with the full beam on the floor. We then will simulate in the water tank. In the water tank we only have a half beam, where he'll look for position - our beam in the water tank just doesn't - you can't do a good job of getting the zero-g effect, but you can get for position. You can se where do you anchor yourself. Where can you grab on something, and what force can you apply? Then we can always go to the 1-g to make sure then we have the right (garble) tool. And we have the actual flight wing as built configuration to make sure where we want to put these items - either grab them by hand or put this bag underneath, because we really have the surfaces we believe are there. Well, in a nutshell, that summarizes work going on to free the SAS wing. There is much other work going on, just supporting the mission - the power profile being studied, the work for tomorrow, looking at what power we feel we're going to have available. I don't have actual numbers on it. I've just got some general feel, but I can answer some questions. The very aspects of the temperature prediction and so on - all that work is going on. This work here is just part of the special work we're doing trying to free this wing. I'm open to questions.

QUERY Rocco, if you get it opened, will you consider extending the mission to make up for some of the lost time ? And if you can't get it open, will you consider coming home early?

PETRONE Well, the second problem I'd like to have. Now, what I mean by that is I wish I did have to worry with all the power -

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QUERY If you don't, can't get it open, would you consider coming home early?

PETRONE The second problem I'd like to have, what I mean by that is I wish I did have, to worry with all the power to whether we'd stay or not. Whether we stay or not, longer, is very clearly dependant very heavily upon what the doctors feel. In terms of what data they're getting, how confident they feel, they know crew position. Now their advise to management is around which we will make that decision. If they feel any discussion of extending the mission very clearly has got to be on what type of medical information we have and how much the doctors feel they know of the status of the crew how well they have faired, and so on. We did commit to a 28-day mission based on having knowledge of a 14-day mission. We've got much more medical information here than we've ever had before. How good it is, one really has to get to the doctor and see how he assess it. And I guess, he's going to say, I've got to see more. Which is about the answer we expect. So, I wouldn't rule it out, but it's very heavily dependant upon the medical evaluation. Now whether we've curtailed, if we can't get it out, at this time there would be no reason to curtail. We've got to run powered down in and do less than the number of simultaneous experiments expected to do. At a period of time yesterday - these numbers are rough, I thought. We set a power profile of 3600 watts we've have gotten to. The system right now is rated about 4100 with the loss of this CBRM number 3 that we had, I guess, a day and a half ago. So you might say, what has (garble) for experiment. What we'll want to do is set a little margin, obviously, so that you don't come off to full depth of discharge on the battery. Some of our batteries, they were six in number, were subjected to higher temperatures than we would have like to have seen when we were pitch down. We were in an attitude for 10 days, in order to, I'd say, to save this mission that the ship wasn't designed for. You see the ATM when pitch down, - see normally you're riding like this, and you get a temperature head on. When pitch down you put heat here. Because you put his head down to keep the sun from beating on this area which we have to do to keep the temperatures down inside the workshop. Then you're going to take a beating up here. So we did heat that area. We know what was going on. We were watching it. In terms of trade-offs this certainly was the thing to do. Now some of those batteries - The batteries rated about 20 amp hour, probably cause they have a lesser capacity to have a charge. However, we have reason to believe, and hope that as we keep cycle and charge, that we can climb upwards back toward the 20 amp hour. How far we don't know. The batteries are built - we look at normally as a 4000 cycle life.

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4000 charges and discharges. And this must tell you it's a very, very difficult thing to test for. You put that in a 16-cycle today and 16 into 4000 will give you how long the test has to be. And that's a general scheme of things to run the missions. So we now are seeing some batteries of lesser ability to take charge than it would have had. Some are working perfectly normal. Now what we have to do is nurse those along and hopefully as the temperatures cool, you charge and discharge and the battery can tend to start taking more capacity. So, on the question of curtailment at this time, I see no need to. I think we could still do a respectable mission on the power (garble) some 4100 watts. Now we do get into a squeeze some CSM fuel cells run out, which is I think around the 14th of June. Because at that time we must feed the CSM power from the workshop. And we're talking like a 7 or 8 hundred load. It means for a period of a day or 2 will be very tight, in terms what we can make available for science but, then shortly thereafter, we start climbing up At the end of mission we're in our 7000 watts and this comes about because they'll be in summary all the time because of they call it Bt - Beta angle,procession of the plane with (garble). So at the end of this mission, our power's building up in a period of about 2 to 3 days, where we'll really have to sweat out. That assumes - -

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PETRONE This mission, our power is building up, to the period of about 2 to 3 days we really have to sweat out. That assumes we don't lose anything else and have no deterioration in our solar arrays. We have no reason to suspect deterioration but that can happen.

QUERY Dr. Petrone I have a hatfull of questions. I'll try to ask them quickly. One. Can you illustrate on the model how far down an astronaut can get with a 60 foot umbilical? And two, the flexible firemans pole confuses me because I was under the impression there was that rigging we've seen on the TV but there was another item we haven't seen which was indeed a pole which - it was telescoping. Is that - -

PETRONE Yeah, they're are two different items.

QUERY Are both of those involved in the possible phases?

PETRONE Yes. Both of those are used as possible tethers or a way to get down there. One is the poles, going to be made up of rods that we put together for the twin pole sail. You know there are 5-foot rods, we flew three per tool. That's 15 feet we have. There were two spares that we flew, we need ten - we need eleven each, we have 12 in each packet, so we can get five and use them and not worry about any damage or anything. When we use the sixth we're going to tether that last one because we feel we may have to deploy the sail yet. So we want to protect our twin sail. But this pole - they're locked together, that would give you then a ridgid handrail. The second item the flexible webbing, which sometimes people call a firemans pole, I don't know why, it looks like that, I guess, it goes down in the hole. That's the one we could also use with a hook at each end, but we are planning to use on that to pull this beam up. Right now it looks like one of the leading contenders.

QUERY Okay. My last question is the power figure you mentioned toward the end of the mission. Seven thousand watts as compared to the presently 4100.

PETRONE 4100.

QUERY Can you tell us what you envision the crew could do with that much power? Full experiments, full EREP - -

PETRONE We'd be in clover, yeah. With 3,000 watts, see, you'd be feeding 800 of that to the command module - look at some curves we have. He would have available for experiments three and a thousand into 1, 2, 3, - - We'd have about 1900 watts for science. And I think with that we could run the ATM and EREP and really not worry. But as I said, there are going to be three very tight days. Starting at about the

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fourteenth of June. Fourteenth, fifteenth and sixteen at which - it's plotted in red here, we got a deficiency and we've got to get by that assuming all things remain (garble). And one way is to pull down some of the command module loads which we think (garble) it's pulling a thousand, but once the fuel cells go off you don't have to have heaters in the cryo tanks because it is not feeding the fuel cells anymore. So we can pull a couple hundred out of the CSM. And for that period of time we'd be on the barest of science, maybe 100 watts or something of that nature for about 2 days. Yes.

QUERY Rocco, is serious consideration being given to extending the mission assuming that you have the power and you have the okay from the doctor?

PETRONE Well, you say - Let me say this, it's worth looking at, yes. It's worth looking at now because we do get this bonus in power. In power limitations, to now until we deploy that wing, have curtailed some that we could do. So it - there's a - there's a item sitting there on the table, now before you grab for it you've got to make certain you're not letting your appetite, you know, control your emotions. You've got to look at what it means and I see medical would be one large thing. There's also the question of just crew condition on how we been doing and so forth. When you say seriously, I say it's worth looking at. Yes, it's very definitely worth looking at. But clearly the decision to go 20 days is a very serious step that we'd have to take and if we get the wing out and we got the power but we're not sweating as much for the next mission, well we got more time we're going to spend up there in SL-III and IV. So that's going to enter the picture why we try to grab more at this time when I'd try to get hopefully 56 days within a period here starting in late July.

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PETRONE in four so that's going enter the picture why I try to grab more at this time and I'm going to get hopefully 56 days within a period here starting in late July. You can see then the factors that fall into that thing but yes it's worth looking at. We'd be wrong in not looking at it, in my opinion.

QUERY What does this bone cutter look like and did I understand you to say that you have no doubt it could cut that piece of metal?

PETRONE I've seen the pieces it cut. In fact we cut seven pieces with the same piece of wire yesterday, in other words, it keeps working. It's a beautiful little gadget. I didn't know they had such things. It looks - if you - it looks like a stainless steel wire, you know you hang picture frames up with. You've seen that, I'm sure. Almost that thickness, embedded within those wires are very small teeth - cutting teeth and they come out random so you've got cutting all the way around and all he has to do - if this is the item you want to cut - put it around that - it has a ball on each end you grab with and all you do is work it back and forth over the item you want to cut. I must say it cuts better than any hacksaw I've seen and the fact that it's flexible means you can get the ball under there. This is the key item. It's a little less than about a half an inch, put the ball under and pull it across and all you've got to do is cut this way. But you've got to be anchored - positioned in some what that when you finally get through you don't go flying. But it's a stainless steel braided wire. I'm sure you've seen them on picture frames and with them out of these teeth that are oriented in it all through the length except for the part you grab with the handle. It's in the medical kit. Tom, I can't answer that question because it's in the dental kit I understand is where it is and they're prepared to do many things medically which frankly - I mean things they've trained on, but I really can't answer that question. I'm going to try to find out. But it's in the medical kit we understand the dental kit and we're very pleased it's there right now.

QUERY What material is the teeth? Is it stainless steel teeth?

PETRONE I cannot answer that. My guess would be it's like a tungsten-carbide but that's just a guess because you want to cut with something you'd like to have a cutting tool like you do on a milling machine and that would be like a tungsten-carbide but I'm not positive of that. But it's material like that.

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QUERY And another question completely unrelated, are the batteries replaceable? Can you take up any additional batteries should the ones which are now unable to charge fully decomposed -

PETRONE These here cannot be reached. They're up on top here and they cannot be reached for replacement purposes.

QUERY No. But the question could we take other batteries up - could we look at other source of power. We are going to but we're looking at that like for the S04 mission rather than the SL-III mission but that'll take some time to develop and qualify. We think there are possibilities of power augmentation that one could develop to take up there for SL-IV.

QUERY Three questions. Is it reasonable to expect that we could do this by next Tuesday? Has it been determined which crewman will do it? And how would you pressurize this washcloth squeezer?

PETRONE Could we do it by Tuesday; that we're going to have some discussions on Monday that will let us put the pieces together - how soon after that we could do it I think is a very difficult thing to say, you know, a lot depends on the pressure that'll be on us. Now we've taken our time working out procedures and the steps we're going to take - certainly no earlier than Tuesday I'll say that for sure because on Monday we're going to put - we are putting a piece together now but Monday we finally think we'll have everything together. We'll be working through the weekend, pooling everything together and then Monday we'll have a discussion. How soon after that - much of that depends on what the crew - how many questions they have. What they want to know. What more they want to see. I don't think by midweek next week that if everything pans out and we haven't given a GO yet because as you know we've got a lot of things to look at be -

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PETRONE If everything pans out and we haven't given a go yet because as you know we have got a lot of things to look at. We've got to be concerned about the safety of the wing and what it is going to do and the material there. So all that is being analyzed and looked at again as we get down to that procedure. he question of pressurizing this washcloth squeezer, there is a source, there are sources on board that they can get through hoses and you'll be EVA through the MDA. So exactly what rag or line we'll hook up to, I'm just not able to answer. But, there are sources on board, we're looking for a very low pressure, probably in the neighborhood of 10, 10 psi. One possibility is the canister - they're subject to a pressurized state of 30. They'll take it out and, with the hose hooked up, use it outside and bleed her down to 10. There's also the possibility of hooking up inside some lines which you vent through. Things of that nature. We really haven't, I haven't seen a scheme - I will a little later today hopefully. I'm going back to Huntsville tonight. I just know they say there is pressure available to 10 psi that they can hook up to. Was there a third question? Oh, that has not been decided, not been decided.

QUERY Dr. Petrone, this is a rather far out question. But, I feel I should ask it. The back pack has been eliminated from its candidacy for use inside on this mission. Is there any chance whatsoever if there were no other way in which man could stabilize himself that that might be used? Was that considered?

PETRONE I don't believe any of us would do that. Mainly because that's an Rand D item. It's an R and R item that we talked about using inside. I personally would not propose it to be used outside. It's up to the (garble) you don't like to do a thing like that, at least I don't.

QUERY Are there any other batteries? For instance do the SAS have their batteries?

PETRONE Yes they do. There are eight more batteries in the airlock module.

QUERY What's their status? Do you have any reading on them?

PETRONE We, they're off-line. We intentionally took them off-line. They should be, and I say should be, fully charged, but not providing any power. Now we have seen two of the batteries (garble) This wing is deployed about 5 degrees. We have actively pulsed some 80 watts out of that wing with the sunlight we've had. And there are 2 batteries that we've been actually pulling a little wattage into. So the system is working in that regard. It's this wing right here - is deployed

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and down in this area, we know the solar panels by the number. And those batteries feeding off of those solar panels at the end, we do see that they will take some current. About 1 amp, very very low, 80 to 90 watts. So each - this will charge batteries in the airlock module.

QUERY Do you think that they might have been subject to less intense heat and therefore be likely to be in better condition than the others?

PETRONE The answer to this is yes, they were not, the temperature was not raised. We do have housekeeping information on the batteries. We know the temperature. As I say, we've been cycling two with the power we've been able to get there just to make sure the system is working. As far as we know, the batteries have not been abused. They have been now on what we call stand voltage. They have been sitting there with no load on them. We have no reason to believe that, it will be 3 weeks Monday, should have affected them. We have no reason to believe that they should have deteriorated.

QUERY Is there no way to bring them in touch with the solar, with the vanes on the ATM?

PETRONE No. There is a very complicated charging system. We've tied the buses together. In other words, you've got a line up here and a line down here, if I call a bus. We've got that tied together. But you could not charge from one into the other. And the question of regulation. Each battery is active more - it's got its own electronics that both charge and regulate. And when the battery is finished charging, you're also feeding solar power direct into your bus. We've intertied the buses so we can feed from one end of the stack to the other. But you cannot charge from one set of solar arrays to the other. The electronics would become quite complicated to do that.

QUERY Would you consider doing this same EVA deploying the twin-pole sail and if not when would you consider deploying this?

PETRONE Well - -

END OF TAPE

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QUERY Would you consider during this same EVA deploying the twin pole sail, and if not, when would you consider deploying this?

SPEAKER Well the twin pole sail is an item looked upon to - for a long duration item, in other words, the parasol is now there, we really do not know the rate at which, and I use the word, it might deteorate, I'm not trying to be cagey, we just don't know. There's indications that under ultraviolet nylon at many, many hours would loose it's strength. We've got many tests under way. Those are also underway at Marshall. There's some tests that are underway at Johnson, and we've tied in the Goddard Space Flight Center, trying to run excelerated tests. That's what's going to tell us when we should deploy the sail. I do not see any urgency to do it next week. As our test now tells us, actually we're looking at a period of 90 days. What's it going to be like in the unmanned period, when we go back. That's what we're trying to answer, that question. So, I do not feel it will be done next week. I do not feel the two will be combined.

QUERY You mentioned these ATM batteries as having 20 amp hours?

SPEAKER That's about it.

QUERY Okay, but you said some of them were degraded somewhat by the - -

SPEAKER Having been subjected to some heat.

QUERY Yeah, by being subjected to the heat. How many of them - approximately how many of them were degraded, and what amp hour life do they have roughly.

SPEAKER It's a verydifficult thing to answer. There were six, that saw higher temperature. They did not all see the same degree of higher temperatures. Our red line was like 30 degrees centigrade. I know we were sitting like 28, 29 , on at least two of those, so the six have seen a higher temperature than we would like. When we say red line, we say okay, it won't malfunction above 30, but, obviously you're taking some life out. That's what we were doing in those hotter - the first part of the mision we had no alternative. It is very difficult to tell how much each one has deteriorated. We do not have individual watt hour meters. We have to infer on the whole array, and the guys who work voltage, how long it takes a battery to come up. See, when the battery gets fully charged, you get a signal, well if one is going to charge faster, it means that its got all it wnats, when it didn't take everything it should have, then that's how you start narrowing down. If you do not have a good, nice indication that this battery is 10 amp hours, then

then that would take a lot more instrumentation, which we didn't put in the system, because of the complexities and the wiring and all that would be added. So, looking at the ganged array, you could where you tend to mask, maybe one battery with the others, when you do it that way.

QUERY Do you have any indication to what distances, roughly are involved, say if you used the bone cutter, and what length of time?

PETRONE Distances in terms of where he would be? Well, it's gonna be less than, I'd say about one third way down the beam. Now, this is 10 feet from here to here, and he'd have about another 10 feet down the beam. That's where he'd be for this, I want to say operation, I guess that's what it would be. I'm really not - like I say - I really don't know whether he is - from the inside where his hose has to hook, whether he can get - this is 30 some feet here. You have 40 feet down on the end. I'm just not prepared to say. He can get close, but it may be like only two thirds of the way down.

QUERY Were the two batteries that died also the ones that were exposed to the high heat?

PETRONE No.

QUERY Were the four batteries that tripped off, were they the ones that -

PETRONE They came back on, yes.

QUERY But they were exposed to the high heat.

PETRONE Yeah, they had less than - they got a depth of discharge in them that took them down to a certain low level. They ought to make a trip up to protect themselves. They came back on. Battery number 3 that failed a day and a half ago was actually receiving its charge, when it failed. No, the battery did not fail, we believe the electronics failed. It was in the regulator that failed. Some electronic difficulty. We are attempting at Huntsville to duplicate the failure in the lab, we've not been successful yet. You don't design these things to fail, but you do get it. But this battery was 17 minutes into the sunlight, taking a charge and doing well, when she just - the incication went on. So for that reason, we suspect the regulator. And the regulator is part of the charging system. And how much power it lets go out and how much feed from the solar cell of the battery. And the one that failed earlier, before the men lifted off. That did come off line, and that we could not get back on line. And have not been able to. We've not given up all hope for that, you keep looking to where you may have upset the logic or you may have done something to your relays, and there's still some possibilities on that battery, number 15, I believe. We've still got

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people looking at the circuitry, and what type of commands or other things you might do, hope is very, very low on it. But, we're just one to give up.

QUERY Rocco, we've heard some of the MOCR people say that with these batteries, the way they've been behaving, we're in the danger of nickle and dimeing ourselves out --

END OF TAPE

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QUERY We've heard some of the MOCR people say that with these batteries the way they have been behaving we are in the danger of nickel and dimeing ourselves out of power. What actually were the decisions to accelerate this EVA? The one you're considering. Was there evidence piling up that looked like you were running into a situation where you would definitely have to cut this mission short, where there was a good chance that you would have to cut it short? And what was it?

PETRONE You've seen it right with us. We've lost the battery before we launched; the one from 18 to 17. We lose about 250 watts. And what we think is totally unrelated we've lost due to electronic failure we believe, although we don't know conclusively, we've lost a second battery and solar cells. You lose them both together because you knock off the battery you also knock off the cell feeding it. So as you know, we've been looking at that SAS wing since day 1. So we have guys working and working at very intently to get out there to do something. I believe we said after we did the SEVA, the first one who went back that was so tantalizing. There it was, you saw a little bit holding it that power would mean a lot to us on this mission. In terms of, using the word acceleration, we had in mind that we might do it during this mission. We knew for sure we would grab it on the second mission. Well, with the loss of the second battery, you say all right if things are panning out as they appear to be, we want to consider and go out and get it. So it wasn't in acceleration of panic or anything or saying we're down to nothing. Because, we could still get a pretty good power profile and a pretty good science. If you can't get it simultaneously you can't do all the things you wanted to. You've got to turn off some heaters. There are some the crew has got to go turn switches, you take a little of their time. You don't like that. You could do it. But the fact where we have been considering getting that beam free since we first saw the pictures was that angle, that piece of aluminum holding it in there. It's been sitting there, as a source of power, we need it badly before we lost - - to do the mission the mission we'd like to do. So, in that regard we just said all right I'll see where we can sit here in a few days and does it look good and is it advisable to go do. I know the crew inside; Pete has talked a couple of times about wanting to get at it. We said, we're looking on the ground and we'll let you know in due time. And we've got ourselves plenty of time to study it. I don't think we've overlooked anything that we know of. So I think when we decide that we want to do it if we do, I think we will have done all the study work, all the work you can do getting ready for it.

QUERY We've had the commentary about these things going off, but I was wondering in the back rooms there was some evidence that some of the curves were starting to show declines that weren't yet enough to talk about openly.

PETRONE We told you that the degradation of the batteries but we still see it is giving us some few hundred watts. I've seen the power where they said 37 and then it was going down to 36 and everything is working well. So what you do is like on the rack you start squeezing both ends how can I get a little more and how can I do with a little less. But, there hasn't been any trend, anything other than what we've discussed right here today that would be forcing us to do anything any sooner than we wanted to do it.

QUERY Doctor, just as a point of interest, when this bone cutter is in a dental kit. How big a piece of equipment are we talking about?

PETRONE Exactly, I'm only surmising here, I've only seen the wire. You could roll it up in a little roll. It's flexable wire, well, it would be about this long. You've got to slip it through and around and with about this kind of a grab, you cut.

QUERY You would have to be out few feet.

PETRONE Yes, within a few feet I'm sure.

PAO I believe we'll take one more question and then Dr. Petrone has to go. Does anyone else have a final question?

QUERY I'm a little bit confused still. Exactly what part of the wing is tied down. Where are the rivets, exictly.

PETRONE On this model here, you've got to assume this to be laying down upon the ship, right about at this point, right about at that point. Not at the end, right here and only over about 2 inches. She doesn't go the full length, only about that much. You've got this angle of aluminum, which is part of what is holding the meteoroid shield. About a third of the way a little less, about a third of the way would be a good estimate. A third of the way down the length of the hinge over into the center of the beam, I'd say about 2 inches over the edge. About 2 inches over the edge. And she had rivets in it. They were attached to the meteroid shield plus some bolts to put two angles together, and as it lap over some of it was caught in that honey comb. That's what it looks like, from their description, it looks like it does in the picture and if you could pry that loose you might be okay.

QUERY Just one more Rocco. Have you got any idea what caused the shield to come off yet?

PETRONE No. No, we've got people putting time lines together, and I think you've heard the time and all. But, we're probably going to have to do some air, we are going to air dyamic analysis and all the load analysis. But we do not have that yet.

SPEAKER Okay, thank you Dr. Petrone.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

SKYLAB III LAUNCH BRIEFING

Johnson Space Center
June 1, 1973
11:45 a.m. CDT

PARTICIPANTS:

John H. Disher, Deputy Skylab Program Director, NASA Headquarters
William O'Donnell, Public Affairs Officer

SL-II PC14-A/1
Time: 11:50 CDT
6/1/73

SPEAKER Okay, we have with us, again, John H. Disher, who's Deputy Director of the Skylab Program at NASA headquarters. And John is here to discuss with you and answer questions with respect to the new launch date for Skylab III. John. You want to open with a statement or just take questions?

SPEAKER I believe you've all read the release that summarizes very briefly our reasons and the planned new launch date for the second manned mission on Skylab. July 27th, a nominal 7 a.m. launch, which gives us a - an M equal 5 nominal rendezvous capability. And I'm - I'd be pleased to respond to questions at this point.

QUERY How valid is that date of the 27th? I notice that in here you've allowed yourself a day or two leaway. And I wonder just how firm the 27th is, and can you give us some idea of launch windows surrounding that date or subsequent dates?

SPEAKER Yeah, it's - it's really probably July 28th, plus or minus a day, depending on the specific orbit that we're in and our specific M equal 5 calculations. And the 27th is the earliest M equal 5 assessment, as we have it. So - No, no, I said our calculations indicated it was the 28th plus or minus 1. So we're working on the 27th on the assumption that it'll come out that the 27th is satisfactory.

SPEAKER Howard.

QUERY Yeah, what - what about SL-IV then? Are you thinking of moving that up considerably, too?

SPEAKER For - for our current thinking, we would maintain the - the three month interval. However, we've not really given serious consideration to the SL-IV date yet, and that will come as we proceed in our planning.

SPEAKER Angus.

QUERY Could you say something about the - you said it in broad outline, but about the Beta angles at this time and how this would affect you? I mean how it would affect a mission either in the case that you get the solar panel deployed or that you do not get it deployed.

SPEAKER Yes, the - not getting into - into specific numbers at this time, which I really would want a chart or something to talk to. But but let me just say, qualitatively, that going earlier, going July 27th as compared with the August 8th plan, gives us, because of the percentage that we're in the Sun at that earlier time of the year, as versus the later, gives us a greater integrated power input from the Sun by going July 27th and - than would it later. Basically, its percentage of time in the Sun will be more going the earlier date than the later. And this is also involved with its fit with the power available from the fuel cells in the CSM. It's not a simple question nor a simple answer that relates only to Sun angle. It relates also to how the power available fits with that available from the CSM.

SPEAKER John.

QUERY When do you move the vehicle out to the launch pad? And does this change in any way your countdown preparations?

SPEAKER The - June 11 is our nominal spacecraft move-out time, and this would not change any of our - the content of our testing. It - it will change their - their detailed phasing, but not the content.

QUERY Will you have to do a lot of overtime work? In what way will you speed up the preparations?

SPEAKER Yes, we will - we will do some work on the pad that had been planned in the VAB. We will work the 4th of July, possibly, and we will work at least one Sunday that we had not planned to work. We will take the open days that we had previously allowed on our prior date.

SPEAKER Go ahead.

QUERY If the crew that's up there now does perform an EVA to attempt to pull out the wing, and if they are successful, would that have any impact on this proposed early launch date?

SPEAKER I see no reason that it - that it would. If we, of course, do get that array deployed, as we hope we will, that would certainly alleviate our rationing of power that we're having to go through currently. But I think we'd still want to stick with our earlier date.

SPEAKER John.

QUERY Well, then, are you saying that it's not just the power situation that is causing you to move up the date? Are there other situations that were brought to bear in this decision?

SPEAKER Well, there is the desire to - to - to get up as early as we can in recognizing that we have been stressing the - the active power system at higher levels than it was designed. And there could be a diminishing of the overall life accordingly. So we would like to complete our planned series of missions earlier, if that is, in fact, possible.

QUERY Overall life of the space station?

SPEAKER It is possible. If we continue to have to stress the - the power system that we're using currently, its overall life could be diminished. So there's a - certainly an incentive to get our missions in as early as possible. Now

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if the - If we're able to deploy the one stuck array, that, of course, will -

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DISHER The power system that we're using currently it's overall life could be diminished so there is certainly an incentive to get our mission in as early as possible. Now if we are able to deploy the one stuck array; that, of course, would alleviate - we'd have the freedom to consider a more relaxed schedule.

QUERY As a contingency, what, if anything, does this do to the time which is now required for a rescue mission? On the day of the launch of SL-II I think it was Bill Schneider that said if they had to go - had to order one that day they could get up in 48 days. Is that time now at all different and if so how?

DISHER No. The - well, it could be - no, I don't see a reason the 48 days would change. So what we will be doing now is proceeding as we would have during the first 48 days and we'll be continuing on that pace somewhat longer period, not quite that pace following that but we'll be continuing at an accelerated pace in order to make the July 27th.

QUERY Still 48 days, minus 6 days or whatever it is now, is that correct.

DISHER Yes.

QUERY You mentioned higher stresses, what parts if there are any specific ones are feeling the strain the most, the battery chargers or the batteries or the circuitry or what?

DISHER It is the electrical power supply of the ATM which is carrying the burden of the mission now, in addition to that of the CSM which is not being higher stressed. What I'm trying to say is the power for the mission currently is being carried by the CSM fuel cells and the ATM solar powered system and the ATM solar powered system is having to operate at higher levels than it would if the complete solar array system were operating. And we're looking at - continuing to look and to refine our power conservation policies if you will so that the housekeeping systems will consume less and they will be more available for experiments. That's - our basic objective is to operate at acceptable stress levels the ATM power system and do all the essential housekeeping and provide a reasonable balance for accomplishing the experiments.

QUERY Well, has your evaluation given you some life on the ATM system then if you operate it at about the average of what you're looking at - the present operations at do you see a life now for this?

DISHER I understand your question - the laboratory at Huntsville are continuing to examine the potential effects of these higher stress levels. We don't

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have any quantitative projection of that - of what that will be but in our original design, of course, we start out with enough extra capacity, low enough operating cyclic load to have a very high confidence of operating for the full 8 months. Now unquestionably there is some reduction in that level of confidence having - been operating these systems at the higher level. Our laboratories are analyzing that. There's no way that I could give you a quantitative estimate of that degradation in reliability at this point.

QUERY You feel confident at this stage then of completing this - letting this mission go to its full 28 days even including doing Earth passes?

DISHER Well, we have to examine very carefully each and every time we go out of the solar inertial orientation. And because we lose our input from the Sun - we lose a percentage of our input from the Sun when we go out of the solar orientation. At the same time, normally we go out of solar orientation to do Earth-looking experiments at the same time and we're turning on added power load for those Earth-looking experiments. We have to consider very carefully that power loss, that power required for the sensors versus the state of charge of the system. One thing that we're looking at right now is going out of the solar inertial orientation for a shorter period of time where previously we had been considering the order of 120 degrees of orbit plus or minus 60 degrees from solar noon. We're now looking at some reduced passes down as low as plus or minus 20 degrees of solar noon which would, of course, give full Earth coverage during that reduced portion of orbit, but would not take power away for as long a period.

QUERY I'm not sure I understood that. Are you saying about 40 degrees for an EREP pass instead of 120?

DISHER We're examining that. Yes, the question is if we find it not feasible to do the full 120 rather than doing nothing, could we do 40 and 40 being plus or minus 20 from noon.

QUERY Where does the importance of television, I'm not including ATM television which is clearly an experiment, but other television; where does that come in in your priorities and in line with your thoughts of power rationing?

DISHER Well, there is television use for the - for certain of the ATM experiments which comes directly to ground - television for engineering purposes, for instance, helping us decide whether we can, indeed, free the solar array that is stuck is important and giving us an indication of the well being of the crew, how they look, how they're performing, how their mobility is, is important and certainly

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conveying on to the public an understanding of how the mission proceeding is important. We try to factor television coverage in without interfering with scientific experiments. There is obviously a trade-off here. We're trying to do that on a balance priority basis. Our science does get first priority however. Yes.

QUERY John I wonder if you could discuss for us just a little of what the current status is relative to the attempt to fix that wing. Give us some handle on how the boys are doing in Huntsville and what management is really thinking of now.

DISHER Certainly. We had some encouraging underwater results - -

END OF TAPE

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DISHER We had some encouraging underwater results yesterday at Huntsville, I understand, with a simulated set up of the - of portions of the stuck array, with crew under water, with tools that they have on - that are currently on board the spacecraft, working on - on simulations of that array. We have coming in today, from the west coast, an actual piece of hardware - The back up - one of the back up solar wings that is being flown in by Guppy to Huntsville. It should be in the big tank tonight. And we should be able to do some testing with that actual setup with a simulated, or rather a reproduced structural angle over it, restraining it as we understand its restrain from Pete's description in orbit and from the television pictures that we have. And the crew will endeavour to free that and to maneuver, to cut the angle for instance, with the tools that they have.

QUERY Can you give us some idea what tools they're working with, such as maybe a bone saw or a bolt cutter? What are they using?

DISHER Yes. There is - You mentioned a bone saw. There is such a device on board. I don't think that's - I think that's a long shot, I would say. But there are a pair of cutters, remotely actuated cutters. There are variations of crowbar, if you will, various prying kinds of tools, and at least one shear kind of cutter that resembles, to some degree, I guess, a tree, a remote tree pruning shear. Right.

QUERY When's the earliest opportunity you see to attempt a SAS wing free?

DISHER Okay. Based on the getting off success - successful test this evening and assessment of those over the weekend, I would guess that about next Tuesday might be the earliest possibility. I wanted to add one comment to Roy's question. The crew did say that the tool that they wished they had, the portable rotary power saw with a metal cutting blade on it. We don't have one of those on board.

QUERY Following along on that, are any of these tools, in fact, the - such as the bone saw or the - or the cutter, are they - any of them power tools which are, obviously, much easier to use in zero-g?

DISHER No. None of them are powered. They're all manually operated, as I recall.

PAO Doug.

QUERY Are we going to have an EVA then sometime next week? Is that what you're saying?

DISHER If ah - If our testing now and our review of that underwater testing and our review of any hazards that could be entailed in going out to do that, say yes, then it's possible we'd have an EVA next week.

SL-II PC-14C/2
Time: 11:50 CDT
6/1/73

QUERY The equipment that's coming into Huntsville, today, and will be in the tank tonight, for test tonight, - -

DISHER Yes.

QUERY - - Is that a real wing or a simulated wing or a real beam fairing with a simulated wing? What is that exactly?

DISHER It's a real beam fairing, and I don't know how much of the insides of it are contained.

QUERY Rusty Schweickart working on that?

DISHER Yes. And possibly someone else. But to my understanding, Rusty will.

QUERY When the - If they are successful in cutting that metal strip, what - how will that come out? Will it come out real fast, or will it come out slowly? Just what will happen?

DISHER It was Pete's assessment, Pete Conrad's assessment, from his examination and from the - from Paul's maneuvering of the - from the crew's maneuvering of the restrained wing in the earlier attempt, that if that angle were - were cut or sheared, that the array would move out slowly in its normal fashion.

DISHER Oh, I have a correction to make to my earlier statement. The flight hardware SAS wing that I talked about is going into the clean room in Marshall Manufacturing for the kind of activity I talked about. That will be coordinated with underwater activity of a simulated wing. My error on that.

QUERY Can you describe a little bit more the EVA? How long would it take, how would they do it, where would they go?

DISHER We're going to be reviewing those procedures over the weekend, and I don't really have a time line on it yet. So I'm just not able to help on that.

QUERY When do you think you'll know when you're going to do the EVA?

DISHER I think probably Monday, late Monday, we should be in a position to assess.

QUERY I just also wanted to clarify that. If the meeting is Monday, you could go ahead as early as Tuesday with the EVA. Is that what you're saying?

DISHER I said that would be the earliest. I suspect that that could be optimistic, but I would think Tuesday would be the earliest. That's what I was saying in response to an earlier question.

QUERY Would it be a fair surmise, John - First of all, we're talking about an airlock module EVA, are we not? Not a stand-up EVA in the CSM.

DISHER Ah, both - Yes, we're talking about a walk-out EVA with a long extended tool. Right.

SL-II PC-14C/3
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QUERY And because of the nature of the beast and the way in which that orbital track lays out, it would be a fair surmise, I guess, and I'd like to check it with you. But we're really looking at something that would occur during day time here in Texas so that you'd have the advantage of stateside passes and maximum comm.

DISHER We have not worked that out. But, certainly, that would be desirable. Right.

QUERY Would it be helpful for your purposes to have someone standing outside the airlock module hatch with a TV camera? (Laughter).

SPEAKER You'll volunteer.

DISHER We normally, of course, do have two men out for an EVA kind of operation.

QUERY You'd try for TV on this, wouldn't you?

DISHER I can't - Well, there's the opportunity to cover from the CSM in the way that we have in the past. I can't tell you what the view angles are from that. I don't know whether we would or not, specifically, take a TV out there on the tether. (laughter)

PAO Okay. One last question. Angus.

QUERY Granted that the procedures are still being worked out, is it also a reasonable assumption that there would have to be some form of assistance for the astronaut to get down that distance to the panel? I'm thinking, for instance, of taking the - removing what we now call the fireman's pole from inside the workshop and deploying it outside. There would have to be some form of assistance for him to get down that area.

DISHER Yes. Depending on how far he travels and the length of the tool that we have. For instance, we do have long poles on board, and the cutting shears that we've been talking about are the kind, they say, that are intended to reach up in a tree and I mean analgous to that, to cut from some distance.

PAO Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
June 1, 1973
9:00 a.m. CDT

PARTICIPANTS:

Milton Windler, Flight Director
John L. Riley, Public Affairs Officer

SL-II PC13-A/1
Time: 09:03 CDT
6/1/73

SPEAKER You got a lot of people with black boxes listening to you, so - -

SPEAKER A lot of black boxes, huh?

SPEAKER Yeah.

SPEAKER All right.

SPEAKER Good morning. We have Milt Windler, flight director on the overnight shift, who'll give you a summary of spacecraft status.

WINDLER Well, I'm pleased to report that - that there wasn't anything too exciting happened in the spacecraft last night. We've had really about all the excitement, I think, we need for awhile. The temperatures continue to drop slowly. They're down now somewhat below 80 degrees, down 79 point something or another. And I think that represents about a 2-degree drop since yesterday, 2-1/2 degrees, something like that. I'm not really sure what point of time that you'll are counting your days. The crew is - has been allowed to sleep in, and I believe y'all probably heard the wakeup. I guess they must have called in for the first time over Carnarvon or some - Honeysuckle, something like that. But we chose not to call them and wake them up; so we allowed them to sleep as late as they wished. I think we did have an indication that they might have been stirring around a little bit before that, but that was their first call. Today is a pretty quiet day. We had discussed trying to do something with the TV, to look at the SAS wing, and - I don't know if you've already been briefed on this or not, but the crew comments indicated that they felt like that they didn't require this, that they had been able to get a very good view of the piece of metal that was hindering the SAS deployment when they were in the rendezvous and dock, in the fly around phase I should say. And so they - they are not too concerned about trying to deploy the TV to view the SAS. And it would have been a fairly complicated procedure to make all that work. So that idea was put aside for the time being anyway. We are not planning to ask them to do very much troubleshooting today. Trying to hold off on that as much as we can until tomorrow. There are a few odds and ends of small items on different pieces of equipment that we might look at, but we're are going to basically try to do that tomorrow. The Flight Plan for tomorrow is - has not been completely evaluated with respect to the power requirements yet. So we're not really sure whether we'll fly our prime or our alternate Flight Plan. The prime Flight Plan right now does have a earth resources pass in it. It comes down across California. It actually starts in the Pacific, just off shore, and runs down through

California and is a good pass in terms of sites acquired. And we hope we are able to do that, that the power works it okay. The rest of the day is basically devoted to ATM. And there are some biomedical runs, although we did delay the biomedical run we originally considered for day 153 until day 154. I guess that's probably about the major points. (Garble) I asked for - if there any questions. Basically, I guess you're getting the idea that on the last day or so the space craft is kinda of just junked along and the crew have been doing quite well at doing the experiments. So we're in a relaxed mode, I guess you might say, for this day off.

SPEAKER Barry (garble)

QUERY Pete Conrad yesterday had some very choice words for mission controllers about scheduling of time and activities. I got the opinion that he wanted you to look real closely at some of the orders that were going up for them to do. Have you - are you looking at ways in which - scheduling, I guess, is what I'm trying to ask you about.

SPEAKER Yes. We think all their words are choice. And the - and you're right; he had some comments to make, which, of course, we certainly expected to have comments going both ways regarding the Flight Plan and the procedures that were sent up. At you are well aware of, it's a fair difference between simulations on the ground and doing the job in air. We have a very hard time simulating the zero-g effects, and it's certainly nothing unusual to have things take in some cases more time than in other cases - less time than that allocated in the Flight Plan. He was pointing at some areas in which things had taken longer. There are - and we've incorporated these into the next day's Flight Plan, as a matter of fact, as best we understand them. In fact, I would guess that during a day to day, we would - as they are sitting around relaxing, we'd probably chat a little bit about some other aspects of it and try to clarify some of these things. We have some questions on some of the procedures that they did, and I'm sure they have some additional questions that they want to ask us. In fact he indicated this last night, I believe. And I don't think he's gotten around to - to putting them all down on the tape recorder or asking them of the ground.

SPEAKER Reg Turner.

QUERY On the question of abandoning the TV look at the wing, I'm not clear in my own mind whether this was abandoned finally because it was thought to be unnecessary, or whether it was thought that it might end up blocking the airlock.

SPEAKER Far as I know, there's no concern about it blocking the airlock. It's the same kind of an instrument

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that we - mechanism we plan to use - and will continue to use in the future, in the airlock. I'm not - that may have been discussed by somebody, but I'm not aware of it - The potential of blocking it. The only reasons that I've been associated with have been the - the degree of difficulty and the amount of the wing that you could see. Whether it was worthwhile from that point of view.

QUERY But you're not in the position where you feel that there can't be an EVA to deploy this wing without having a look at it through the airlock?

SPEAKER I'm not real sure that I followed your question there. But I believe you're asking if we - We don't feel that there's any requirement to have - to put the TV in it before we do the EVA. That's true; we don't. Because the crew was very explicit about this, if you listened to their comments or read the transcript that - In fact, I didn't hear it; I was reading it. So I just got mine off the transcript. But they - they seem to be very positive that they were able to identify the problem and in fact had some comments on some proposed solutions, I believe. Something about the surgical saw or something like that. And so we think that they do have a - already have a very good evaluation, and that there's really nothing to be added by - by going taking the time to put the TV up.

QUERY One gets the impression the EVA has been given a much lower priority in the last day or two. We're not likely to see it happen for some time. Would that be right?

SPEAKER No, I wouldn't say that. In fact, there's a great deal of effort going on, and it has been going on and continues to be active in trying to look at methods to deploy the wing. As you probably are aware of, Rusty Schweickart is at Huntsville, and they have their assembling equipment. I believe they have got a backup wing assembly that they have flown from California to Huntsville. I don't know whether it's there yet or not. I think it was suppose to arrive - I guess it's today. I'm not real sure even what day it is, to tell you the truth. But the effort is continuing, and there is a number of people that are, we think, very strong crew procedures and systems people that are working on this problem, and they're working at it steadily, which means pretty close to 24 hours a day. So I wouldn't say that there's any lessening of - -

END OF TAPE

SL-II PC-13B/1
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WINDLER - - means pretty close to 24 hours a day. So, I wouldn't say there was any lessening of importance in that. Now, of course, nobody has said exactly when you know, would be the best time to any kind of an EVA. The first effort is to try to ascertain the best way to losen the wing. Then we can decide later.

PAO Peter (garble).

QUERY Is there any kind of a time line would you estimate as to when they do that EVA, this coming week, before Wednesday?

WINDLER No. I couldn't say when. Because it all depends on what comes up with the tests at Huntsville.

QUERY And are you getting any closer to solving this battery regulator, CBRM problem?

WINDLER No, I don't really think we are. I had to leave a meeting in which they were discussing that kind of a subject to come over here. So, I'm not really completely up to date on all the testing that's going on in Huntsville, where they are running batteries through cycles and making evaluations of them, under the kind of conditions we've actually experienced on the flight. The kind of thing I'm sure you're aware of and would expect us to do. And ah - I know that that work is also progressing and, I'm sure that probably somebody is closer to understanding it than I. I really haven't been briefed on that and I don't know. I know we're trying to take a conservative until we do understand the problem. Of course, we're trying to take a very conservative approach to the batteries. And are managing the power system so that we recharge the batteries each daylight cycle, and don't enter the dark side with partially depleted batteries as we have been doing in the past, which, of course, we thought was okay. And apparently, now there's some conditions there that we don't completely understand, as you're well aware of.

PAO Pete.

QUERY Could you dwell on your fuel and gas propulsion studies, what the outlook for those are, in relation to this notice that they're looking to launch SL-III a little earlier?

WINDLER Yeah. I don't really - I think that probably doesn't have a whole lot to do with the propulsion. You're probably asking about the attitude control system. We still - We're in good shape on the attitude control system. We're not using any TACs fuel, hardly. We used about 60 pound seconds, I think, which is a very small amount, compared to what we've been using. And it's even less than we anticipated before the mission, for that - for an EREP pass. So, we feel that as far as that particular consumable is concerned, that we are in good shape, but there's a lot of uncertainty about managing the system when the crew isn't there, plus trying to get the - if

SL-II PC-13B/2
Time: 09:03 CDT
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in case there ah - other equipment that may be taken up and other methods to deploy the SAS. We really do feel like we need to get the other solar panel out.

QUERY Are you indicating then, that the reason for looking at the earlier launch is to get an EVA accomplished earlier?

PAO I don't know that Milt has been in on the early launch planning. Bill O'Donnell is going to try to get Mr. Disher over here.

QUERY Oh. Okay. Good. Some of the inputs from the flight - -

PAO Yeah. Why don't we wait and see - -

WINDLER I don't think those two things are related, though, the EVA and the early launch. I don't know which EVA you're referring to but - -

PAO (garble)

QUERY It's a week - oh, 6 days since you got the parasol deployed. Can you give us some sort of indication of how you think it's working. And is there any sign of any degradation from TACs firing either from physical distortion of the parasol, or contamination?

WINDLER There's ah - Of course, that's a difficult thing to tell and as best we can tell, there isn't any decay, or whatever you want to call it in the ability of the parasail. In fact, we're very pleased with the way it's dropping the temperatures. They're coming down steadily. And if we, you know, if we had unlimited power, or had the normal power system we could run the coolant loops in a different fashion and even make it better. But as you're well aware, the temperatures are dropping steadily and we're all ready down to the level where the crew can operate. So, we're pleased with the performance of the parasail and really it seems there's no real change in it, other than it's steadily getting better.

QUERY Don Puddy, last night, said that some time yesterday, there was another loss of 300 or 400 watts someplace, they can't figure out where it went or how it was lost, have you had any - (chuckle) Have you taken a look at that last night or early this morning?

WINDLER Yes. You know, President Johnson, I think, was famous for going around the White House and turning off lights, to save electricity. Well, the crew's been doing that. And we think we've found 2 or 3 hundred of those watts in just the lights and some other odds and ends that they've turned off. The crew didn't - I don't think they realized they were contributing as much to it as it was. And they've kindof soft pedaled it I think, in their answer to the ground. But when they added up all the lights that they probably have been turning off, it does amount to over 200 watts and that's probably the difference that we were seeing. And you, of course, also realize that it's hard for us on the ground to tell them to turn off this light or that light, because we're not sure exactly what they need. And of course, they understand the situation and they've been cooperative and they've been themselves conserving power. It's kind of like Fred Haise, you know, he was so convinced that Apollo 13, when he was coming back, the necessity of conserving water that he wouldn't take a drink (chuckle). So he wound up, - I guess he had a to take some antibiotics for kidney infection later on. But, he was very conservative with the water use.

QUERY Do you have any indication at all that the excessive heat that the ship was put through the first 10 days may have degraded some of the batteries and made them less powerful than they should be? And also, I understand the batteries are very old.

WINDLER Well, I guess I'm really not familiar with the age on the batteries, but there is the possibility that the temperature profile had an effect on the batteries. And that's one of the things that's being pursued now. And I guess it would be real premature to comment too much on that until the tests are completed.

QUERY What's the status of the EREP experiments? Are they going to start running those again tomorrow?

WINDLER We'd like to very much. And we have those in the day 153 Flight Plan. However, as pointed out earlier, we don't - We have not completed the power analysis and we're not sure that the power will be sufficient to allow us to do that, even though we have a short EREP pass. We expect it will be, but we just haven't confirmed it yet. We're right now, trying to hold the EREP passes to about 20 degrees on either side of the solar noon. And it turns out on day 153, it works out very well, because it - that's about the time we'd want to do it anyway. It just happens to put us - I think solar noon occurs over Los Angeles, or something like that, which has got a lot of - Southern California has a lot of EREP sites in it anyway. And it makes it a really good situation from a lot of EREP site coverage.

QUERY Do you know if the crew's had any takers on their wager, whether they can run around the water ring lockers or not? They're supposed to demontrate today.

WINDLER No I don't know about that, but I listened to a conversation, and I wouldn't be surprised at any thing (laughter) that they try to show that they can do up there.

QUERY That was my question, also.

WINDLER Oh. I guess we'll all have to watch that and see what happens.

PAO Okay. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 31, 1973
7:42 p.m. CDT

Participants:

Donald Puddy, Flight Director
Larry Bourgeois, Jr., Corollary Experiments
William Moon, EGIL
Milt Reim, PAO

Shift briefing
5-31-73

SL-II PC-12A-1
Time: 19:42 CDT
5/31/73

PAO We'll get started here. On my right is William Moon, the EGIL. And on his right Don Puddy, the Flight Director. On the far right - I got it mixed up here, didn't I, excuse me, let me start over here. Larry Bourgeois, Jr, he's the corollary man, and then we have Don Puddy, and then William Moon.

PUDDY Okay, well let me start out this evening, as you were probably were briefed last night, we did have a problem with S019, whicn are UV stellar photography experiment. Larry is the fellow who monitored that for us, and we went through the troubleshooting procedure as scheduled the first thing this morning, did find a plans that was binding some of the gears, and were able to go ahead and repair the instrument, subsequently installed it in the anti solar cell, and this afternoon had an operational pass, and I brought Larry along just to give you a few words about that particular experiment. Larry.

BOURGEIOUS Okay, the problem with S019 is that, when you extend around the SAL, you rotate a mirror through a tilting rotation mechanism to point it at celestrial objects. The problem was the tilting mechanism was binding. The crew could not - could not tutn it. We went through the malf procedures this morning, and there's various gear mechanisims from the tilt rotation knob, they pulled the tilt rotation knob off, and the panel behind the knob, and they were able to observe that there's a radiation - there's a flange behind the gear which drives the rotation readout mechanism, which was bent outwards, and was obstructing the gear which drives it. That display mechanism. They were able to bend it back and put the S019 back together, and it operated properly.

PUDDY Okay, as far as spacecraft status goes throughout the day, we did maintain electrical balance. We did some powering down this morning, as it turned out, we powered down probably a little bit more than was absolutely necessary. We actually had about a 300 watt pad over what we had expected to had. We ran around 3700 watts, and we expected to have a load most of the day of around 4000 watts. We again did some troubleshooting on CBRM 15, which you've been briefed on, I know several times. Again, I'm unhappy to report, we had no joy with that troubleshooting, so at the present time, anyway, I'm afraid that we've lost that particular capability, which means that we have lost one-eighteenth of our power capability, or about a hundred forty watts total capability. As you probably were briefed last night, we also had a problem during the EREP pass, where after the pass we came into the nighttime frame we had four batteries kick off line, and shortly thereafter

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two batteries kicked off shortly after we went into nighttime, two more a little bit later, and finally towards the end of that pass, we had a REG trip off line. We were able to command the batteries back on line, however the regulator associated with CBRM number 3, we were not able to command back on line, we have not done any additional troubleshooting today, because of the very packed crew timeline. And probably will schedule that after the crew day off, which is tomorrow. I'm not sure, I can't make any statement as to whether or not we expect to get that particular regulator and consequently that CBRM back on line or not. Let me just say a couple of words of explanation to you. On the regulator, basically what that particular device enables us to do is to supply power either to the battery or directly to the bus.

END OF TAPE.

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PUDDY - - of explanation to you. On the regulator, basically what that particular device enables us to do, is to supply power either to the battery or directly to the bus. It's more or less in the same context as the SAS output. If you lose a regulator or you lose the SAS contactor, as we call it, you essentially have lost total power capability from that particular source of electrical power. But, we will be doing some additional trouble shooting on that, and have some hope of being able to regain that. As far as temperature is concerned, we expect now to stabilize somewhere in the habitation area at around 80 degrees. As I briefed you 2 or 3 days ago, the rate of decrease was expected to slow down, and it has followed that trend. And we are presently dropping some where around a half a degree a day. Today, we did turn off one of the coolant loops as a power conservation measure. Saw no significant noticeable increase in the overall temperature, which means we're - we're gradually cold soaking down to what we consider to be a stable temperature. And expect - we're bringing that loop back on line during the night time frame. And we expect to go ahead and continue to decrease slightly during the night time frame. As to exactly as to when we're going to reach the lowest temperature, it is pretty hard to predict, but I imagine we're talking again in the order of 2 or 3 more days to completely stabilize. I think the only other, well there is a couple of other items I probably ought to mention. One, you may have copied on air to ground, that we're contemplating taking some TV of the SAS wing. This is being worked throughout the Center, here and also at Marshall. We still have high hopes of being able to get OWS wing 1 deployed and to take advantage of that electrical power. With that particular wing deployed, we certainly would be back in the mode of operation where everything would be completely ops nominal as far as experiments are concerned. And as you are well aware right now, basically what we're able to do is still conduct an experiment protocol. But, the experiment protocol does have certain limitations associated with it. Which means, you can't simultaneously conduct experiments in the ATM, the biomedical, and the EREP area at the same time. There is just too much power required. We have, however, as you're probably well aware of also today conducted simultaneous ATM and biomedical experiments with no problems, in fact we had power to spare. We also conducted the corollary experiments, one of which Larry briefed you on. In fact, I think we had, we had 6 ATM passes scheduled today. We also had 4 or 3 runs of the M-131,

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which is the vestibular function test, special orientation tests and we also had our standard M092, M-171 run. I think you probably also have copied some comments from the crew as far as the cramped timeline and the problems that they're having following that particular time line. And, let me just say a few words to you about that. Basically, I think we're finding that in space it has taken just a little bit longer to do some of the activities than it did here on ground. We expected that this might be the case, but we had more or less agreed with the crew that at the start of the mission, we would go ahead and try to fly as full a protocol as we possibly could and that once they began to experience some problems, in meeting the time line, we would go ahead and make the necessary adjustments in the flight plan to allow a little bit of extra time. We're also finding, as we did in Apollo, that some of the housekeeping tasks, of which there are a lot more in - -

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SPEAKER - time. We're also finding as we did in Apollo, that some of the housekeeping tasks, of which there are alot more in Skylab than there were in Apollo, are taking a considerable longer period of time than was anticipated by either of us or the crew. We've also, as you've probably well versed on, if you've listened to air to ground today, had these little start up problems, with each new experiment as we progressed into it. The learning curve, both on the ground, and on the spacecraft, is very high. I think that you will see in the next few days these things will tend to smooth out tremendously and operations will tend to become fairly routine. I don't believe I have anything else at this time. Bill, do you have anything you want to add from electrical power standpoint?

MOON The only thing we're doing here different is - we are changing the power. That is we're powering down, so that we can do the experiment runs everyday. And we are able to maintain energy balance which is one of the constraints here. I feel that powerwise, if we can power down to a certain level everyday to - and we look at flight plan to achieve this power level. We're in good shape as far as doing most of the experiments.

SPEAKER Let me add a little bit to that. What Bill is talking about. When we say powering down, we essentially are not disabling any crew capability to a significant extent. Give you a couple of examples of the things we're doing. We have a requirement to try to obtain as much TV as is possible. There's two ways to obtain TV. One, is to go ahead and do it at anytime of the crew day. And put it on a video tape recorder. And subsequently dump it to the ground. Well, the video tape recorder happens to cost us around, I believe the figures somewhere around 400 watts total. We can go ahead and power down the video tape recorder and get the same TV picture. All we got to do is make sure that we got these scheduled over ground site where we can essentially dump on real time. And this saves us a tremendous amount of power. We just don't use the video tape recorder. For instance, the TV that we took today, of which we hope to have around - well, we got about 10 or 15 minutes of it real time. We recorded about 30 minutes. We will re-record some additional information on one of the additional ATM passes tonight. About 5 minutes worth. And we plan during the crew day off tomorrow, while we're over the States, and we expect low power levels to just go ahead and dump it. So we're not losing anything there. One of the other things is we're running with a single coolant loop. And as I pointed out

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a minute ago, at least during the daytime frame. And as I pointed a minute ago, we've been able to do this quite successfully with no significant impact to the crew comfort level in the spacecraft. The other things, just like at home, turn off the lights, if you don't need them. Things like that. So, these are, you might say, taken away some of the luxury items. But we're not taking away any of the basic capabilities that were designed in the Skylab spacecraft. So with that, let me open the floor to questions.

QUERY Contemplating TV of the SAS wing. Can you go into that?

SPEAKER Okay, we started looking at this about a day and a half ago because we were extremely interested as to how we get a closer view of just exactly what this metal strap is. Exactly how close to the OWS SAS solar array beam fairing. It is located. Make sure we understand just exactly what the material is. And how is the best technical way to approach these things from the standpoint of releasing that beam fairing. What the TV - if we can possibly accomplish this is expected to do, is to give us some higher resolution picture of that particular strap. It's exact location and enable us to in the water emersion facilities over at Marshal Space Flight Center. Run some checks that the crew might be able to --

END OF TAPE

SL-II PC-12D-1
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PUDDY - in the water immersion facilities over at the Marshall Space Flight Center, run some checks that the crew might be able to perform during an EVA operation, that might allow us to cut that strap or pry that strap loose, and actually free that particular wing. So that's the intent of the TV. Let me go on and say that we're still in the process of trying to accomplish just exactly procedurally how we would do this. We're talking about a device which is, as far as the deployment of the TV camera, which is very similar to the one that we used the other evening to deploy the parasol. In other words the T027 that has the extension rods. You mount the TV camera on some of these rods, and you extend it out the antisolar SAL. Which, by the way, presently right now is occupied by the S019 experimant that Larry just briefed you on. One of the problems associated with that is that to get the proper look angle to that wing, you've gotta go through some angular contortions, and one of these that we're looking at is the possibility of a 90 degree lens. And one of the key questions that needs to be resolved is just exactly whether or not we can take that camera, mount that 90 degree lens on it and still have enouth clearance in the T027 canister to make sure that we don't run into any problems either with the deployment of that mechanism or the retraction of that mechanism. We certainly don't want to run any risks whatsoever of hurting the SAL usage for the remaining part of the mission. So that's what we're looking at. Those procedures are not completely developed, and what we're doing on air to ground tonight with Pete was trying to get some idea from him as to just exactly what he thought would be the feasibility from his standpoint of accomplishment, also it is his crew day off, and it's one that's one that's well deserved, and we certainly don't want to put him in the posture of spending the whole day - his whole crew day off on something until we're totally convinced that it will be profitable, and that he feels free that he can go ahead and do it. We know he still has quite a few housekeeping tasks that he would like to get done, and several other things that we probably haven't completely conversed on, and so we're just trying to feel him out. He's also being asked probably about this time as to just exactly in his opinion, basically, what additional information, he feels we might gain that we can't, say obtain from him through some more detailed questions. So it's just again various aspects are being looked at to try to figure out how is the best way to attack another hack at the deployment of this wing. And I'm not even saying we're going to make that

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attempt. I'm just saying we're continuing to investigate.

QUERY Don, what time of day would this most likely be done, and what - how would it fit in, they got a pretty much open day, except for some minor housekeeping and some physical training and so - and all. What kind of time frame is it? Would it take 3 hours to do it?

PUDDY Our best estimate right now, and this is including setup time and clearing out the SAL after we finish, our best estimate is that it will take approximately 3 hours to go ahead and accomplish this. As far as the best time, several things are being looked at. One is, we'd certainly like to do it over a long pass, where we can talk with the crew about it, and can hopefully get some of the TV ourselves. We would - We've got a couple of other things in the flight plan, even though some of them are minor to us, they're pretty major to the crew, like this is the first chance for a shower since liftoff, and we certainly don't want them to miss that opportunity. So, we're looking at it, but I would imagine that we're talking probably one of two options. It's either going to be in the morning over the states, or in the afternoon over the states, which really narrows it down for you.

QUERY What kind of chance is it that the ground would have the procedures worked out so that they can do it in the morning? And do you think it would be more likely put off until the afternoon to get those procedures worked out?

PUDDY No, I think if we have all the procedures worked out they will be worked out during the nighttime frame tonight, and certainly would be on board for crew review the early part of tomorrow morning.

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PUDDY - - they will be worked out during the nighttime frame tonight. And certainly would be onboard for crew review the early part of tomorrow morning. I think it's just basically trying to juggle the time line to make sure everything fits the best, and gives the crew the maximum amount of latitude as far as free time.

QUERY One more. When would you expect the next EREP pass?

PUDDY I think we've got one scheduled now on day 153, which is the day after crew day off.

QUERY Are you working towards an EVA on a particular day?

PUDDY No we are not. Basically, what we are doing right now is still trying to gather enough data so we can evaluate the tools and the procedures that would be used for an EVA. Right now out intent is to continue to go along with the - an experiment protocol much as we had originally planned.

QUERY Say on the electrical situation, did I understand you correct, that this regulator that you cannot get back on line at the moment, has that effectively robbed you of a third battery until you fix it? The second thing is about turning off the lights. Can they in fact do this? I understood to start with that the lighting was a basic system that just came on when the thing was powered up. And the third one is, can you give us any sort of number, rough number as to what the increase in your power would be compared to your present situation, if you could get that wing deployed?

PUDDY Okay, I may start out in reverse order, and see if I can remember all of your questions. If the other wing was capable of being deployed, and all three sections of it were fully deployed, we're essentially talking about an increased power capability of around 3,000 watts. In other words, we're essentially talking by the way we can hook that particular power system up, almost two thirds of the capability of both wings. So it is obvious that it would be a tremendous boost. As far as your first question is concerned, we do have the, well let me make sure. Why don't you rephrase your first question.

QUERY Well, I didn't quite understand what you said about that the facts you had a regulator that has not gone back on line.

PUDDY We have lost right now, to the best of our knowlege, with all the trouble shooting procedures we have been able to come up with, 1 CBRM, which includes a battery. We have lost the regulator on another, which

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essentially has cost us the second battery and capability during a day side pass of feeding power to the bus. Let me just say, that the way that electrical system works is that during the day cycle, we are providing power not only to the bus, but to charge the battery. During a night time pass, of course, we are discharging the battery only. Now when you have lost either the input between the SAS and the regulator, or if you lost the output of the regulator, then what you have lost is the capability not only of using that battery power during the night time frame, but also of charging the battery. So you have essentially lost total power capability. I think I've explained that correctly, haven't I Bill.

SPEAKER Well, that's for the first. In CBRM 15 we lost the SAS contacter which does provide power. That contactor does provide power to the charger and to the rig. On the third one, the CBRM 3, excuse me, we tentatively think that it might be in the reg control logic itself. But, on day 153, we are going to do a little more trouble shooting on that CBRM there.

QUERY The lights.

SPEAKER The lights.

SPEAKER Well, upon entry, they have what they call emergency lighting, that's normally on. But, each light itself you can turn it off or dim.

SPEAKER We also have several consoles. For instance, the ATM console has a - what we call EL lighting, electroluminescent lighting. We have proven time and again that it's, although it's helpful to have that particular type of lighting, it's certainly not essential. It is a large power drain - -

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PUDDY - luminescent lighting. We have proven time and again although it's helpful to have that particular type of lighting, it's really not essential, and it is a large power drain, and that can separately disabled and still use the regular lighting on the panel to read all of the meters on there, so we do have independent control capability over some of the lighting capability.

QUERY When can you say what percentage of the original Skylab electricity is now operating, and second, if you use the fuel cells in the Command Service Module, how much percentage of the total that you started out with would you be able to add.

PUDDY Well, let me say that we have lost one-ninth of the capability that we had shortly after Skylab 1 liftoff. And we're talking right now, our basic power generation capability, an average, and we don't want to get into Beta Angles and all this type of thing, an average power generation capability that we have right now, without the loss of the two, assuming that we cannot regain those were we were talking around 4500 watts. Each of these losses amounts to a drop of 140 watts, or a total of 280 watt capability we've lost, so we're down to what, 4220, is that right?

SPEAKER 4200 watts.

PUDDY 4200 watts, rounded off, it may be a little bit in excess of that, as a total power capability. Now, if you brought the other wing out, I indicated to you that you would have an additional power generation capability of 3000 watts, or you'd be up in the 7200 watt region.

QUERY What about the fuel cells?

PUDDY Well, right now we are essentially using the fuel cells per se, merely to power the quiescent that loads in the CSMs. They're not supplying any power to the OWS, nor is the OWS supplying any power to the CSM.

QUERY I'm not sure I understand yet. Last night there seemed to be some feeling that you couldn't work on these CBRMs and now you're talking about maybe troubleshooting them and fixing them. What can you do to one, and what can't you do to it, in the way of fixing it?

PUDDY Well, if you followed Apollo missions, it's the old try, try again approach. As you're probably well aware, we were in thermal conditions for quite some time frame that we didn't expect to be in. As over all temperatures continue to stablize, and things of this nature, we will continue to just cycle switches. That's basically the only capability we have. It's not something where we're talking about taking a hammer and a screwdriver and a pair

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and going out there and having at a particular electronics box or relay module. We don't have that capability. It's just basically going through and cycling switches and hoping that if we do have cantaminate condition in relay contacts or something that is an intermittent, we might be able to catch it at a particular time under a particular thermal condition where we can again make that contact and maintain our capability.

QUERY Let me put my question a little more clearly. I appreciate that, but what I wanted to know is are they sealed up so you can't get at them or not?

PUDDY Oh, all of these - they're all outside.

QUERY Paul Weitz said something this morning about a high CO2 reading throughout the spacecraft. I didn't hear anything, or don't remember anything after that point.

PUDDY Well, we were running what we call a CO2 monitor test and basically this is one of those experiments where we again have come up with a small problem, as we activate the - this is essentially just a - what we call a DTO or a detail test objective that we are carrying on board, where we have the capability of monitoring CO2 and dew point. And I believe they call it the contamination experiment, and basically, what we're trying to do there is to measure the CO2 and dew point. And this morning we did actually, well this morning, was the first time we noticed it. This morning we had some trouble in that particular experiment, where on one half of it, what we call system A, it looked like part of the sensor may have dried out. We have another --

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PUDDY - - half of it we call system A. It looked like part of the sensor may have dried out. We have another check on that this evening, and we have asked the crew to go ahead and use the redundant sensor system in the CO2. As far as CO2 level is concerned, I have not heard that reported high with any degree of belief. In other words, as far as I'm concerned CO2 level in the spacecraft is well within the region of where we expect it.

QUERY I understood last night that each one of the CBRMs was worth 250 watts. Was that an error?

PUDDY Well, I've been laboring under the assumption that - I was under the assumption that they were worth about 140. I guess we could do some mathematics here and figure it all out.

SPEAKER Well, the number that comes to my mind is about 200, I don't know maybe 180.

PUDDY Okay, we've got a range here. I think -

SPEAKER It all depends upon the beta angle and all that and the other.

PUDDY There are a lot of factors that enter into it. I think that you can say that 140 watts would probably be the minimum number. Under extreme conditions, yes, you could get as high as 200. I don't know about the 250, that sounds a little high to me, as far as the loss of one CBRM being that high. It is essentially - if you want to, we're talking about each CBRM being 1/18th of our power capability. And we expect at the average condition 4500 watt generation capability. So I guess that does come out to right around 200.

QUERY Going back to when you do the EVA, in the light of what you've said since you answered my first question, surely there's some, there is going to be a tremendous advantage in doing it quickly isn't there if the pictures look good tomorrow?

SPEAKER Well, let me clarify a couple of things. A, I didn't possitively say that we're going to take the pictures tomorrow, because there is still a lot of work to be done there. And B, I said, I didn't positively indicate that regardless of whether or not we got the pictures we are going to do an EVA. All that is being looked at. Our hopes are, of course, if something can be figured out, where we can do the EVA. As far as the time limitation on it, no, we're not nearly as short in time duration here as you were on the SEVA for instance, because what we're talking about is performing an EVA, very similar to the type of thing we do when we go out and retrieve the ATM film.

QUERY But have you, assuming you have got

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pictures that give you hope that you could do something tomorrow. Have you got a lot of procedures to work out after that? I thought that would mostly be done with Rusty at Huntsville and so on.

PUDDY Oh, he's been working, he's been working several concepts, several different ways of going at it based on the original pictures that we got from the SEVA activities and the description from the crew. None of these have been completely refined into detailed step by step crew language. It's one thing to take a concept and say okay, don your suit go into the water tank, take the bone saw, go down there and saw on the strap and see how it all works. It's another thing to write it up in short consise crew language, which will explain it to a man that's orbiting around some 200 and some odd miles above the Earth and say you go do it. We have proven that it is feasible to do. So, from a standpoint of testing out concepts, yes several concepts have been tested and several others are still under work. As far as transforming the procedure that would be selected into crew language, while some of that has been started, it hasn't been completed. And there would be some time delay from the photograph to starting on the EVA.

QUERY Don, they were talking about the I think it was the decibel reader, this little machine was out today or was - seemed to be reading awfully low, I think it was one of those funnies that they wanted to look at. What do you think the decibel reading is in there? Is it very high or are they really getting good low readings?

PUDDY It just so happens I happen to have the expert with me who can explain that to you completely.

SPEAKER Well, I'll just show you the instrument. This is a sound level frequency analyzer, and what they do is they take this throughout the different compartments of the workshop - -

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SPEAKER - this is a sound level frequency analyser, and what they do is they take this throughout the different departments of the workshop, and read the ambient sound levels. And when Pete first reported he was-he said he was doing about 22DB, which was awfully low. You'd expect to read somewhere in the fiftys, I'd think, which is an average room with people talking. And he said he went through the checklist and this is the knob he was referring to. Setting it to the proper positions and he could no. get anything above 22DB, no matter what kind of noise he made. He started fooling with the knob, he said, and he eventually got a reading around 55 degrees, which is something in the order of what you'd expect to hear. And basing what we've heard from Pete, it sounds like there's two possible problems we're looking into right now. One is humidity or some kind of contaminate in the microphone, which can be wiped out, which they have observed preflight, which would be fairly easy, it's just a matter of unscrewing the microphone and cleaning it out. The other possibility is there's a know down here which he has to have in the linear position; right next to the linear position is the external filter, which feeds the sound through a filter, a band-pass filter down here which cuts the DB level way down, and it turns out you get - I tested it before we came over here - you get in a room about 60 or so DB sound level and you turn this thing to the external filter position and it goes on in the range of the twenties. Which leads me to think that this particular switch was in the wrong position. Right now, we really haven't determined exactly what the problem is.

QUERY I've got three questions. You talked about the concepts for this - freeing this strap. Could you give us some idea of what they're considering? And second, in your estimation, when is the earliest that they might try to do this? And third, you talk about a 90 degree lens for the TV, how will they rig that up? Will that come from some other equipment, or is it all part of the TV?

PUDDY I'm not positive. I haven't been working directly or nor have I been in contact with the people that are running the tests at Huntsville, as to exactly just - the details of the procedure they're going through. I know they're looking at using some of the same tools that we used on the SEVA, possibly, in slightly a different matter. A couple of things I've heard talked about is a crowbar type approach, just to try to pry this particular device far enough away from that particular beam structure where it can

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flare. It looks like, because of the characteristics of that particular material, which is a very brittle, but very tough aluminum, we possibly may be able to fracture it. It also, having those characteristics is a very difficult thing to cut. It is also, apparently an angle iron, which makes cutting it even more difficult. We are looking into the possibility of using a saw, bone saw, that is on board to try to cut through this particular material, and going any further than that, I'm afraid I would be getting out on a shallow limb.

QUERY Well, I guess we aren't on the same frequency. What I was wondering is a SEVA thing or is it something where they're trying to stay with the spacecraft and crawl along it? Pete had the idea of shimmying down the beam. How are they going to get at this is what I was wondering about?

PUDDY One of the big problems associated with this particular EVA procedure is just exactly how do you get there? And there are several items that are being looked at there. And I am not familar with exactly the testing that has gone on there. Milt, have you got any words exactly on what they've been going through there?

SPEAKER No, they only one that I'm aware of is that they have been talking about using something like the, and this may not work out at all, it would certainly have to be simulated, but using something like a fireman's pole. As merely a devise which one crewman could translate down to that particular structure. All of this and any procedure that we'd come up with, would have to be verified, of course, and made completely sure that it was a very safe thing for the crew to do before it would be attempted. But, right now as far --

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PUDDY - - sure that it was a very safe thing for the crew to do, before it would be attempted. But, right now, as far as I'm aware of, most of the concepts do revolve around a normal EVA and not a SEVA type thing, where we're actually going to undeck and drive around to that area again. That's not to preclude - that's not to say that we wouldn't do that, but most of the concepts that are being looked at right now are not in that thing. Did I leave one other one unanswered?

QUERY A couple of them. In your estimation, when is the earliest they might attempt this?

PUDDY I would hesitate to guess on that. It's dependent on whether or not we go with the TV, what the TV shows, how long it takes to run through the simulations. The pictures or verbal descriptions here from now on might throw us on a completely different track. It's not something we feel like we've got to rush into, I guess is the point that I'm trying to get across. It's something that we certainly would like to do, and we'd like to do it as soon as practical. But, it's not something that we say, boy if we haven't got this done by day 154, we're out of it, because we're certainly in that posture.

QUERY And about the 90 degree angle on the TV lens, is that coming or something they'll rig up or where will that come from?

PUDDY That's something that requires a little rigging. Basically using the camera with its standard lens, you just do not get quite the perspective that we would like to have on the wing. And what you're talking about is essentially a prism, to give you that 90 degree feel of view and there is not, it is not exactly compatible with the threads on the TV lens, so there has to be a little Rube Goldberg device figured out such that we can attach that and assure ourselves that we are not going to lose that lens.

QUERY Where will the prism come from?

PUDDY I cannot exactly answer that question. It is part of the lenses that are carried on the spacecraft, but I can't swear to you which experiment it is associated with.

QUERY It definitely not part of the TV, it's out of some other equipment.

PUDDY Yes, that is true.

QUERY When will you be able to say whether or not you're going with the TV in the morning.

PUDDY Tomorrow morning sound soon enough?

QUERY Ten minutes before or what?

PUDDY Oh no. No, because if we, if we do

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some procedure like this, there is certainly going to have to be a detailed procedure prepared for the crew. And that will have to be uplinked. They'll have to have time to review it, gather the equipment together. There would certainly not be anything like a 10 minute notice. I guarantee you that. But, I don't think as far as giving you a final GO/ NO GO on whether or not we're going to take the TV is going to available much before tomorrow morning.

QUERY As far as the possibility of doing this TV activity tomorrow, have the crew said anything on the link? I haven't heard anything of how they propose to spend their first day off?

PUDDY Well, every crew day off has associated with it certain housekeeping tasks. There are certain things that we have to do on a periodic cycle regardless of what the scheduled crew activities are. There are a certain amount of housekeeping associated with the command module, the workshop and so on and so forth. These items are all scheduled into the flight plan. There is some experiments like S009, which we have to essentially reset each day, to make sure we have lined it from a period, an orbital period standpoint and from a beta angle standpoint. This type of thing is done on a daily basis. And they've got to do that type of activity. And as I pointed out, one of the few things is the old Saturday night shower, which is scheduled for all 3 crewmen. Basically I think the extra time that is alloted with or without the TV, the extra time is basically going to be involved in regrouping and sitting down and just thinking about how they think is the best way to progress in the weeks to come and probably some discussion between the ground and the crew on several of that type items.

QUERY Would it be possible, Don, once you deploy the - -

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PUDDY - that type of items.

QUERY Would it be possible, Don, once you deploy the camera out the ANTI solar SAL, to turn the thing around so that you can look at the parasol?

PUDDY No, I don't think that there is any way in the world that you can get an aspect angle on it. You're essentially on the other side of the spacecraft, and I think you would have to have two or three 90 degree lenses and a couple of extension poles between then to get anywhere near of a clear picture of tho parasol.

QUERY You have some 18 or 20 feet, though, don't you, of poles or an extension mechanism in the T027 canister, where you could put it out that far if you wanted ?

PUDDY You could, but essentially once you got it out that far, you've still got to look back in the opposite direction, which means you almost gotta mount it through the lens. That's not feasible.

PAO Don, if I could break in here, I've just been informed that the crew, they passed it up to the crew that because of problems in developing the procedures there will not be a TV tomorrow. And you'll be able to hear that. We'll play the tape back as soon as we get through here.

PUDDY Well now that we've discussed that subject thoroughly and -

PAO We'll take one more or two more questions and then we're going to ask that you -

QUERY Okay, I'll just ask one then. Nobody's ever said a word about using these experimental maneuvering devices they have aboard for this EVA so I guess you're not even thinking about that. Why is that?

PUDDY Well, I think that basically on the maneuvering units, the idea was to test those in zero g, but in a confined environment and EVA is certainly not what we would consider to be a confined environment, and we're not willing to take that risk.

QUERY You mentioned showers earlier, when he sent up a flight plan, will there be a time line for showers, or could you give me any idea how long it will take them to take a shower?

PUDDY There certainly is. I believe it's called housekeeping 7-J, and there is an alloted period of time in the flight plans that are available out there on the desks for you that shows that particular activity and that's what it is.

PAO Okay, for those that aren't aware, we do plan to have a short briefing in the morning some time around 8:00 or thereafter. T hank you gentlemen.

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SKYLAB NEWS CENTER
Houston, Texas

ATM BRIEFING
Johnson Space Center
May 31, 1973
10:02 a.m. CDT

Participants:

William C. Keathley, ATM Program Manager, MSFC
Dr. Robert MacQueen, High Altitude Observatory, Boulder, Colorado
Dr. Ed Reeves, Harvard College Observatory
Dr. Richard Tousey, Naval Research Laboratory, Washington, DC
Dr. Giuseppe Vaiana, American Science and Engineering, Cambridge, Massachusetts
Guy Jackson, Public Affairs Officer, MSFC

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PAO This is a briefing on the results of the operation of the Apollo telescope mount. On my right is William C. Keathley from the Marshall Space Flight Center. He is Chief, ATM Experiment Branch at Marshall. And Mr. Keathley will introduce the principal investigators, then he has an opening statement and from that time on he will conduct the conference. K e a t h l e y. And Mr. Keathley you may have to spell some of the names of the principal investigators for me.

KEATHLEY I think we just set a record. I think we just started a press conference on time. First of all, I would like to introduce the ATM principal investigators which we have here. We have one missing, who is pulling a shift on a console right now, in the science room. Just to my right is Dr. Ed Reeves from Harvard College Observatory and he has the S055 experiment. Just to his right is Dr. Richard Tousey from the Naval Research Laboratory in Washington D.C. T o u s e y. He is from the Naval Research Laboratory in Washington D.C. He has the S082 experiment. Just to his right is Dr. Robert MacQueen. He is from the High Altitude Observatory in Boulder, Colorado. He has the S052 experiment. To his right is Dr. Giuseppe Vaiana. And Dr. Vaiana has the S054 experiment. And he is from American Science and Engineering in Cambridge, Massachusetts. The one missing principal investigator is Mr. Jim Milligan, from Marshall Space Flight Center, and he is the principal investigator on S056 experiment. As I said Mr Milligan is pulling a shift at the science room console right now. All right, now that the introductions are over, I just wanted to sort of set the format for the rest of the briefing. We have some - a recorder and a monitor here in which we plan to show you some results of yesterday's video downlink of three images: the H-Alpha image that we got from the H-Alpha telescope on board the ATM. I'd also like to show you an image of the corona, which we got from the S052 instrument, and also an image of the Sun in extreme ultraviolet, which we got from the XUV disk monitor, which is a part of the S082 experiment. Now, after that I'll ask each one of the principal investigators to give his assessment of what he has accomplished to date. And then we'll open it up to questions and answers. I'd like you to bear with me for the first part of this thing, because I'll ask certain of these gentlemen to step down in front of the monitor and we'll try to select out that portion of the tape to show you those images I was referring to and if you'll just bear with us until we find that part of the tape. We think we've got it all figured out, we don't have any technical difficulties and then he'll step down and describe it. First of all if you can get us to the H-Alpha

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image we'll ask Dr. Reeves to step down and discuss that particular image.

PAO I believe I'll have to ask the mike handler to come over and hold the microphone for the principal investigator. Here's one, thank you.

REEVES Well, just a few words of explanation. The H-Alpha telescope is a telescope which is quite comparable to the ones that are used on the ground to regularly view the Sun over a worldwide network to get an assessment of the solar activity and the features that are always present on the solar disk as the Sun rotates with it's 27-day period. The H-Alpha from the ground gets a resolution of about 1 second of arc normally, and in fact, the telescopes that we've provided for ATM also get about the same resolution. They're a 6-inch telescope, which were built by Perkin-Elmer, and our guide telescopes, there are two for redundancy. These telescopes provide the astronauts with a video image of the Sun's disk, and then he uses those to guide the ultraviolet and X-ray experiments very precisely down on the very small solar features which we can see, which we have not ever been able to see with previous satellites because of a limited resolution. So now we can get very high spatial resolution with the X-ray and ultraviolet instruments. And we have to provide the astronaut with a way of guiding to exactly the spot we want so that we can get detailed spectra, as well as the broader field images, because most of the experiments, at least some of them, have two modes, one sort of an imaging kind of mode and one a detailed spectroscopic analysis mode. The astronaut needs these to tell him where to go to start the activating sequences of the experiment. And one of the H-Alpha telescopes then provides a photograph which comes back down to the Earth at the end of the mission, as film recovery quite comparable to most of the other experiments. And we use that as a post-flight record of exactly where the instruments were. We then compare those with the other H-Alpha telescopes that were taking pictures around the world at the same time and we know then that the development and how to bridge the gap between the data we saw and the data analysis and history that we build up on the ground. With that kind of broad background, can we see the H-Alpha? Here you can see the kind of display the astronaut is presented. He has a video display in H-Alpha, which is a line of neutral hydrogen. You can see a small active region here, a filament which was dark. And this is not the best contrast picture, but this is a very very quiet region on the Sun which normally has no structure that you could call active regions or promises great activity. It's a quiescent - a large quiescent area. One of the subjects of interest to be analyzed

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by the experiment are the chromospheric network. You can see a little patchiness, and that little patchiness is of great interest to us, because this is perhaps the region where much of the heating of the solar atmosphere takes place. The astro - this is a video picture. Here is the full - here's almost the full Sun. Now the astronaut has the capability of zooming the magnification, just like any optical system. You can see here again, some active region bits and some small prominences. These are reticles, just to register where the telescope is in regard to these two crosshairs. Now the two crosshairs can be moved inside the telescope to line up with say, our instrument or with Dr. Tousey's instrument particularly. Those instruments which want to put a very fine slit down on a particular feature. He sets the crosshairs to - in the H-Alpha telescope - to our instrument using the sharp limb of the Sun and then he slews into the feature, changes his magnification, and puts our slit down exactly where he wants it and takes the data. I think that's probably enough words of explanation on the H-Alpha. Do you want to now go on to the other experiments first, or -

KEATHLEY It would be appropriate if we had some questions and answers just on this particular image, because we'll lose it - just emphasize this is a recording of the same image the crew is seeing on board.

REEVES The room is rather crowded so let's be sure to wait for the mike before you ask your question.

QUERY What do you see from these pictures? What does it tell you - anything more about the Sun? They look like average features?

REEVES These pictures of the H-Alpha are nothing new. They are not as good resolution as the best we can get from the ground. They purely provide a guide function to the astronaut who can now see these very small features. It does have one slightly interesting characteristic and that it's video. And the characteristics of previous observations from the ground have been photographic. Very high contrast, very black, very white, pretty pictures. But for television you can get a much greater dynamic range. So we can see some of the structure on this kind of display more easily than they can be seen from the ground. Particularly we can distinguish between flares and just brightnings in inactive regions. So the video does provide us a way of turning down the intensity and turning up the contrast so we can get more data than we could from the ground.

QUERY What would a flare look like in that system then?

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REEVES An active region. I'm sorry we don't have a good active region. The Sun's like that. If this is an active region here and it were blown up to fill the whole field of view, you would sort of see an enhanced area where the intensity is about, oh some four or five times what it is in the quiet background. And a flare then becomes a very small, very bright point, many tens of times, hundreds of times the intensity. The temperature goes way up and the density is very high, they become very bright. In photography from the ground those flares are hard to see because a film only has a limited dynamic range and when it's saturated, it's black. Whereas the video you can sort of keep cranking up the level and open it up, so you can now distinguish between these bright flares and ordinary activity in an active region. And, of course, flares are one of the things which the experimenters are most anxious to go after.

QUERY Do I understand this right? The video that you're getting from the spacecraft really just tells you what you're going to get when they bring the actual film down, as far as scientific research, the information you're getting at this point really doesn't give you anything new or does it give you something new?

REEVES It provides, as I say, only a couple of things. The photographic data that will be brought back will be one of the very best sets of continuous records of H-Alpha. Because he gets 24-hour coverage, which any ground station never gets because of weather and even the distribution provides, stations around the world provide some loss of coverage. There will be some interesting data there for some experimenters, but it really isn't anything of great significance compared to the other experiments. I believe this gentleman up here had a - -

QUERY (garble) of 24 hours what percentage of your orbit do you get?

REEVES We are in daylight for about 60 minutes and dark for 30. So, it's roughly two-thirds daylight. I think he had another question so -

QUERY How do the active regions look? You haven't seen any flares?

REEVES No, we haven't seen any flares yet.

QUERY Are there any developing regions?

REEVES There was a region which started to develop and then started to peter out again. This is the low part of the solar cycle. Our activity in ATM is centered around a great variety of solar features. We do expect sometime during the mission to have flares. Whether we'll be lucky enough to catch one, is quite a different story. We're trying very hard.

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We have devices on board which ring bells for the astronauts. So, we'll stand a good chance, but there aren't going to be very many chances.

QUERY Following up, you just answered the first half of my question about the alarms for flares. Was this the developing region yesterday that caused the flare alarm that Conrad referred to when Kerwin tracked something on the surface?

REEVES I believe that was known as a South Atlantic Anomaly, which is a region over the eastern part of South America, which is sort of in a gap between South America and Africa, which is a region where the radiation belt dips down fairly low into the atmosphere. And if the astronaut's not quite careful enough to turn off these alarms before he flies through that region, then the electrons and protons trapped in that magnetic region will trigger his alarms for them. So I'm afraid it was not a flare, but rather a false alarm.

QUERY But when there is a genuine flare alarm, can you just describe a little more in detail where the data comes from that enables you to tell the astronauts go and look for a flare and how is this transmitted.

REEVES He has on board, all of the main requirements that he needs. He has a daily update from us which advise him on the base of the worldwide network, which regions are probably going to show flares and what that probability is. If one of the flares does go off, we have an X-ray detector. One of the experiments may describe that later this morning, which we can adjust the threshold for either little tiny flares, middling kind of flares, or great big flares, depending on whether we want to interrupt things or not, and how actively we're seeking flares at that point in the program. That will cause an alarm to go off. He knows therefore that there's a flare which has exceeded certain prearranged threshold, and he can then use his H-Alpha display to go look for the flare. The object being to catch that flare during the very interesting rise time. Not to get there after the action's all over. And the flare starts to decay.

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QUERY From what you've said, it is not clear to me why go to the trouble and perhaps the expense to send the H-Alpha back to the ground when the guy who's using the guy who gets most use out of it is the astronaut himself. I don't understand the value to the ground on this.

SPEAKER That's right. For flares we're - from the ground our pictures would be quite unambiguous about where he was. For a lot of the experiments, for 2 of the experiments particularly, namely Dr. Tousey's and Harvard's, which is our experiment, we are looking for a variety of other things, such as study of these filaments - very fine scale structures. And we want to bring back photographs that allow us to say not just that it was in the filament, but precisely where in the filament it was, so that we can then go to our observers who are working with us in companion programs at other observatories around on the ground. And say, okay we were looking exactly there - not just somewhere in there but precisely there and inter-compare the data.

QUERY So why do you need this picture on the ground now? Why can't you wait for it to come back in the spacecraft?

SPEAKER The data on the ground here now, the video, is purely for us to be able to assess the astronauts' viewing capability, to assess the performance of the telescope and what kinds of features he can see with what kinds of clarity or difficulty, so that we can then use that in order to get him to observe the kinds of features we want. I don't want to - -

SPEAKER There are daily planning sessions that go on with this downlink with this information. Then we can plan the next day's activities, once knowing what he did that particular day and exactly where he was pointed also. So it helps in the planning cycle. That's where most of this TV is used.

QUERY - directed at you because you're the first one up there.

SPEAKER I think we should proceed on and I think we'll see some more and then there can be individual conferences lined up too.

SPEAKER The next image we recieved yesterday was the coronagraph on the S052 experiment, and Dr. McQueen will describe that.

MCQUEEN This TV image comes out of the S052 coronograph. It represents the occulting or blocking of the Sun by a set of external disks on our instrument, which provide an artificial eclipse of the Sun. So, the basis for the coronograph is to examine the solar corona, the faint outer solar atmosphere, on a regular basis throughout the entire Skylab mission. And in a very real sense, we are having an eclipse made to order, an eclipse occurring each day on command by the astronaut so that we can study the time evolution of the outer solar atmoshere. A study that cannot be done any time on the Earth because of the infrequent occurrence of solar eclipses. So in a certain real sense, we're filling in the gaps between times of total solar eclipses with this coronagraph. Now this image which the crewmen sees looking through the coronagraph shows the corona like one sees during total solar eclipse almost like one sees during total solar eclipse. Solar north is in this direction. There aren't very many features up here. That's because they're of the nature of the solar magnetic fields and the energy transfer in the Sun, the polar regions don't normally have large structures. Solar south is down here. There is a very prominent streamer here which is a region of high electron density. There are lots of free electrons caught in magnetic field lines if you will in this direction. And this feature has been observed from the ground in the very innermost corona which is all one can ever see from the ground with special instruments for several solar rotations. We are now able to follow the structure of this streamer all the way out to solar, to 6 solar radii. Now you can see the things going by. That's contamination. That's little particles of dust which are around the spacecraft. Because we're looking right at the Sun those are, we see preferential scattering in the forward direction. And it highlights little tiny particles very much. This is an excellent contamination monitor if you will. There is a very bright active region - well there is an active region it's not very bright, on the Sun in this position, and this is the right corona over that active region. There are streamers here as you can see. Interestingly enough, this morning astronaut Kerwin reported that there was a new solar streamer on the east limb of the Sun which was not there from yeterdays picture which you are seeing here. And also he reported that he can see very clearly a polar plume over the north pole of the Sun, which is a little surprising to us. We didn't really think we were going to get a very good look at polar plumes. So, in summary what we are doing is providing an eclipse of the Sun with this instrument, an eclipse of the Sun every day. We block the bright solar disk and we're able to see the corona from about half of a solar radius above the limb out to 6 solar radii above the limb.

QUERY Why do you think the streamers coming off seem to be further to the south than they are to the north, as least the pictures that we saw?

MCQUEEN The precise inner - the precise location of streamers with reguard to solar features is not well understood. Simply because one has not been able to have an instrument like this observing the corona over a long period of time. There is a magnetic field configuration on the Sun, which we know from magnetographs made from the ground. In this southeast region of the Sun, which it is suspected is very conducive toward the forming of a very stable structure out in the corona, the magnetic field structure is a very stable thing. And it persists for many rotations. And that we think is the region which is the base of this corona streamer. What we really hope to get from this instrument is a much more clear picture of the relationship between coronal streamers and features on the Sun.

QUERY What you're seeing is one and a half to six, isn't it?

MCQUEEN One and a half to six - a half radius above the limb to six radii to - -

QUERY Right. In the picture, at the south pole there was a very dark area. Is that an artifact?

MCQUEEN No, that's not an artifact. That is the stem that holds our occulting disk. We've got to hold them up some way. This accounts for some of the operations the crewmen does. For example he makes a series of pictures like you saw. He then takes the whole ATM cannister and rolls it 90 degrees so that it moves our stem out from that region and then makes another sequence of pictures. And that way, we can build the whole corona up.

QUERY What percentage of the time is the ATM on? Is it on all the time that you're not doing something else?

MCQUEEN That's very tempting. The ATM is not on all the time you're not doing something else. The ATM in theory has the capability of course of operating any sunlit pass. Some of the power problems that have occurred early in the mission have meant that there is more of a conflict between medical tasks just from the power consuption basis, so that we're now observing something like 5 to 6 daylight passes per crewman day. And as Dr. Reeves pointed out to you, that means about 50 to 60 minutes each pass of actual sunlit time. I should mention that 3 of the instruments are running unattended - that is, while

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the crew is asleep. We have limted command capability to the coronagraph, the Harvard spectraheliometer and the American Science Engineering X-ray instrument, and we do make observations during the crew night, every night, with those instruments while they are sleeping. But the modes and functions are limited over what the crew can achieve.

QUERY How many daylight passes had you planned to have if you did not have these power problems.

MCQUEEN We'd hoped to run somewhere around 7 or 8 daylight passes on a good day. Now a good day to us is defined as a day when there are no Earth resources experimentation, simply because to do Earth resources you have to roll the whole spacecraft over and look down and clearly we can't observe the Sun then.

QUERY What is the significance of seeing a plume of the north pole?

MCQUEEN Well I probably emphasized that. It's significant to us because they are relatively faint structures. They are faint - i guess a good example would be if you could imagine sticking a lot of garden hoses in the ground and letting them stick up out of the ground. They are structures that occur over the poles of the Sun. I wish I had a good eclipse picture to show you. And they are relatively faint structures. They represent apparently a very narrow bottling of coronal material, electrons, within magnetic field lines. And they are faint and they are small. And we weren't really sure that we were going to be able to see them. I should point out that the TV image that you saw, because of the fact that it is a television system, SECC videocom system, is a factor of 3 times poorer resolution than the actual data we're receiving with the coronagraph,. So that we'll be able to see 3 times more detailed structures if you will than what you're seeing on that picture. And we're very excited about that. We can achieve a resolution which is nearly comparable to pictures made at a reasonable eclipse site, that is, in terms of angular resolution. Eight-arc-second resolution and sometimes if you go to eclipse you'll have really good skies and you'll get down into the 3 or 4 arc-second range. Most of the time, you're in between 5 and 10 arc-seconds of seeing at eclipses because of the thermal problem. So we're right in the ball game with good eclipse pictures and the advantage is we've got 8 months to watch the corona rotate and change.

QUERY Have you been able to associate the streak with any particular feature on the Sun? The streak that went up.

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SPEAKER This one that went this way?

QUERY Yes, that is right.

MCQUEEN Yeah, not with a very well defined feature now. Yes, we have identified that with a filament which has been rotating around the Sun for a number of rotations. The filament isn't there now if you can use the analagy that it sort of slopped out of the bathtub. But the bathtub is still there. And so the magnetic field configuration presumably still exists there. One of the very interesting things we want to look at is to compare these data with the X-ray and the ultraviolet data made in those regions so as to try and get a good feeling for what the structure at the footpoints of these streamers are.

SPEAKER That may be an appropriate time to show the XUV images and see the correlation, or attempt to see the correlation. Dr. Tousey, if you'd show that image it might put things together for them.

TOUSEY The S082 experiment is really 3 experiments, S082A, S082B, and the extreme ultraviolet monitor. The extreme ultraviolet monitor is what you'll see here. It is a television system which shows what the Sun looks like in extreme ultraviolet radiation of a very broad band, a band that covers the ranges of 4 of the instruments aboard Skylab. The S082, 5 or rather 4. The S082A, the Harvard instrument and the two X-ray instruments, not perfectly, but they overlap with it. So one can take this as a kind of preview of what each of these instruments will see in its own very special way. This is a picture of the high atmosphere of the Sun. The region from perhaps 100,000 degrees from up through the transition region and into the corona at a million degrees all sandwiched together. The other instruments that I mentioned sample at different altitudes in the Sun's atmosphere by picking out monochromatic or narrow band pass radiation bands with which to make the images. So for the first time, from an orbiting spacecraft, it is possible to see what the Sun looks like in extreme ultraviolet and you will never be able to see this in any other way on the ground except from an orbiting spacecraft. Because these radiations can't get around to the Earth. This will be used for two principle purposes, or really three. The first purpose is to show the astronaut who sees the same thing on his CRT, on the control and display panel, what the Sun looks like in the radiation that these four instruments studying he can point crudely - this is a circular reticle. And we see in this case that the Sun is not quite with the instrument, the monitor is not quite pointed at the center of the Sun because the circle is off

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center, but in some of them it was on center, but he can tell what is perhaps most interesting on the Sun to watch. The PIs on the ground have available the same image also to study and to use in making up their plans to advise the astronauts what to do for the next day. And then after the mission these will be valuable for scientific purposes. Here we see some very strange looking objects. We see an active region that is extremely bright. We see some more that are very bright on the limb - -

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TOUSEY We see models coronal emission from more less quiet coronal regions, and we see a coronal hole - this very black object, if you want to call it object, from which there's almost no emission. It does have in it a few bright points. North is here and South is here, and the equator goes across here. I think east is here, so the Sun is rotating this way. No, the dark spots are cool spots. The bright spots are the hot dense spots where flares are likely to take place. And this coronal hole is believed to be a region where the corona is at a lower temperature and a lower density, and there's some reason to believe that the solar wind comes out of coronal holes to a greater extent than from any where else on the Sun. You can also see the limb of the Sun is bright, just the opposite from what it is in the visible and near ultra violet. One is looking at a shell of emitting gas and when you look through a shell edgewise it automatically looks brighter than it does if you look through it at right angles. Like looking through a sheet of emitting gas this way and you see more of it than if you look through it this way.

QUERY To what depth are you seeing here? Is this like the top surface or through a few layers, or what?

TOUSEY No, we're looking at an average of probably 10,000 kilometers more or less. From the - From some what above the temperature minimum, which is just beyond the edge of the visible limb, up into the corona, not to the corona that Dr. McQueen showed you, because that is still farther out, but the very base of the carona, where the temperature first reaches the million degree range.

QUERY Can you - I realize these pictures are probably very new to you since you haven't been able to see them from Earth. If the bright spots are where you think solar flares may develop, can you guess maybe how that process would occur. Would we look for a bright spot to get brighter and bigger and eventually would the flare be produced, and how long might this process take? That sort of thing.

TOUSEY It's just barely possible that this can be done. If the system is watched carefully by the crewmember on the TV panel. In the mode with which he can do this, it will not be as bright as this. He will see very little, but he can see, so he says, some of these bright regions. I think that one of the first signs of a flare would be seen on this monitor, if he were watching it. Probably sooner than on an H-Alpha, although this is a question that no one really knows the answer too. Incidently, I might say that this - these images had about 20 arc seconds resolution. The images to be obtained by

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the photographic and photoelectric instruments will have at least 10 times better spatial resolution, so this is a kind of a quick and dirty - you might call a quick and dirty way of having a look at the Sun and it's very exciting and tells you what - it whets your appetite for what the instruments may bring back.

QUERY Is there anything in that picture that surprises you about the Sun, or did you think that's exactly how it was going to be?

TOUSEY We've had some samples of this type of image before, both from our rockets using extreme ultra violet and the X-Ray rockest of AS&D and others, so that the features were not unexpected, but here they're much more impressive in some ways, because they appear to be so bright and contrasty. The contrast between the dark coronal hole and the active regions shines out. Here the point quite nicely, and you can see the radical - the circular radical lined up very well. Incidently the north and the south poles are both coronal holes, if you want to call them that.

TOUSEY We can - I might add here in closing, I think that's probably all the questions there, the Doctor, I don't see any more. Why don't you just return to the podium, and we'll open it up for questions and answers in just a minute, but I might just interject at this particular time that later on this afternoon, we will have still photographs of some of the images you're seeing on television and they will be released out of the PAO office here. The photographs - I've seen a sample of the photograph and I might caution you that the photographs during the reproduction period did not come out quite as good as that TV image. We went back and tried to reproduce them and see if we can improve them. We'll have them later on this afternoon. you can pick them up from Guy Jackson here, or one of the PAO people here.

SPEAKER The Photo Branch down the hall.

SPEAKER I guess now to follow the format, we'll just go down the line here and have each individual principle investigator describe what he has accomplished so far, and how his instrument is operating. We won't attempt to describe the instruments themselves. That would take far too much time, and why don't we just begin off with Dr. Reeves.

REEVES Well, I'd like to say just a couple of words first. The Harvard instrument is a photoelectric instrument, which is called a polychrometer. The detector, instead of having a spectrum spread out, we have a number of photoelectric detectors which simultaneously record the intensity from various heights in the solar atmosphere, because each one is set to be at a specific temperature.

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The data is, instead of being recorded on film, is recorded on magnetic tape and dumped once in orbit, and played back here to the Johnson Space Center, where it is displayed for us and we can look at that data, so-called quick-look, when the system is operating up to full function and be able to respond to that data and change our observing program in response to what we're actually seeing from the Sun, so that when new things come up, when we see things that we are more interested in than we thought we were going to be, we can stress them, conversely, when we can see the data and when we feel we have accomplished some of our objectives we can lower the stress on those and get on with the others. We did manage late last night to get a first sample of quick-look data through the system, and although the instrument provides a dynamic range, if you like, equivalent of a photographic range of something like 32,000 to 1, the photographic process - the images we can get are something like 4 or 5 to 1. But I'd like to ask a colleague of mine, Dr. Noyse, if he'd just take a minute or two and just show you some of these pictures.

NOYSE Thank you, Ed. These are literally hot off the press, only an hour or so old, so we apologise for the quality of these. I might point out that we can have photographic reproductions in a matter of 24 hours that we can distribute. I have here an example of a picture, here's the solar limb. This is in the light of hydrogen at 900 angstroms, (garble) continum. This is a negative, so black things are emission, as opposed to what you've been seeing earlier. If you look carefully you can see a fuzzy cloud above the limb, which is a so-called solar prominence, which comes through very clearly in our data. As Dr. Reeves mentioned, we can observe sinultaneously, in seven different aligns, which means seven different altitudes or temperatures in the sun. This material you see emitting here is 10,000 degrees, but simultaneously we see what the Sun looks like at that same position at 100,000 degrees, and a million degrees. And we can see this prominence in many aligns extending upwards to higher temperatures, although not at the million degree temperature. This is a region of cold gas, which is existing, refrigerated, if you like in the hot corona. By cold, I mean it's only 10,000 degrees, whereas the surrounding corona is perhaps a million degrees. Thank you. I'd like to show just a couple of more pictures. These are pictures on the same scale of the center of the quiet Sun, and if you look carefully, you can see the pattern of emission that reflects the H-Alpha picture you saw originally with little dark fibriles, which some people think may be related spatially to the

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places where most of the coronal heating occurs. The so-called network - emission network. And one interesting question is how far does this emission network extends into the corona, because if it extends bodily into the corona, that may say that the heating in the corona is also localized over this network. This is a very pressing scientific question today in order to understand the heating of the corona. And here is a picture of the Sun, not at the hydrogen temperatures, but at a temperature of about 100,000 degrees in the light of doubaly ionized carbon which shows in fact this network exists very well at that altitude. This was already known from earlier rocket data actually. Here is a picture at a somewhat higher altitude, of course (garble) to 5 times ionized oxygen, and of course brought to a temperature of about a quarter of a million degrees Centigrade. And again we see the same pattern, so we can see that the network extends at least that high. Finally here is a picture of the Sun with the same spatial resolution at one and a half million degrees, from 9 times ionized magnesium at 600 angstroms, and if you look carefully you can see that the pattern is reflected in here, but it's really a much fuzzier and qualittatively quite different. I'm not prepared to talk in detail about this, but just as I said, the data only has been in our hands for an hour. but it's quite clear that we would be able to resolve the question of where the heating is localized at the one and a half million degree corona level.

QUERY Is that all coronal, or is it chromosphere too? Are you above the chromosphere there?

NOYSE All of these pictures were - This is purely coronal. This is in the so-called transition zone, between the chromosphere and corona, and this is - the whole transition is on - This first picture I showed was chromospheric.

QUERY Are those features related to the convective cells in the photosphere or they -

NOYSE There's a large scale pattern of convection called the supergranulation, which has a size of about this on this particular scale, and these we are confident map 1 to 1 into that conduction pattern, and we know also that the magnetic fields are probably set up by this convection pattern, also mapped 1 to 1, incidently, and are related to the heating probably.

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QUERY Is this the first time you've had evidence that the network extends so far up?

REEVES Dr. Tossy has had evidence that the network extends up to at least this level before, and as I say, it's perhaps too early to tell exactly what the structure of the network is. It looks to me as if it's probably there, but I would not want to state at this moment that we know for sure that the network extends into the corona, but I would say this is the first evidence that we have had which will tell the tale, probably in a few days after looking at the data we could give an answer to that question.

REEVES Again, you can remember that the contrast here that, if you like, draws out these networks cells is visually is very hard to get tuned up just for this one photograph, so that when the analysis proceeds, the dynamic range of the instrument will be tuned in order to enhance those to a maximum, if fact, and then we'll be able to see them much more clearly.

SPEAKER All right, to Ed, did you have anything else to add. All right Dr. Touousey? Well, our A and B instrument have both been used to a considerable extent, and we don't know what we've got on the photographic film strips, of course. We do know, however from the slip display, one of the closed loop TV display for the astronaut is the image of the Sun on the slip of the B instrument. This is very useful in connection with the pointing. We know that the ATM pointing is very stable, so that we're pretty sure that the astronaut has been able to point the B instrument at the place that's our interest, and that the instrument is coaligned with H-Alpha. We've - I don't remember exactly how many frames have been taken, but we've used quite a lot of pictures and owing to the South Atlantic anomaly event that was alluded to earlier, we did take some pictures as the Sun set and may well have images that tell about the attenuation of the Sun's radiation by the the Earth's atmosphere. This is one of the joint observing programs, number 7, to study the Earth's atmosphere in this way, and we may have run this by chance. The 82A instrument has taken more than its share of pictures. A lot of share, but this may very well be all to the good, too. I don't know just what else to say about it at this stage, except that everything is going almost normally. There are always a few things one worries about, and of course one never knows what one has on a photographic instrument of this type, until he actually sees a developed and fixed photographic images, and has them in hand, so that. Ed Reeves and I are at the opposite ends. He

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gets his results right away. We have to wait and wait and then we get ours all of a sudden, we hope, in a month or so from now, or perhaps less than then. I'll let you look at ours.

REEVES Dr. McQueen.

DR. McQUEEN Well, the white light coronagraph went through checkout on mission day 2 and 3 by ground command almost completely, then the final checkout was accomplished with the astronaut at the console on mission day 4. From the time which we were turned on until now, we've exposed between 900 and 1,000 frames on the corona which is right on our budget for the total mission. We have a film canister which contains approximately 8,000 frames, and as Dr. Tousey just mentioned, we got it all in one fell swoop when we process the pictures. We're very pleased with the TV image, it shows the instrument is extremely well aligned. It shows the astronaut is doing the alignment procedures which he does every time he makes a picture through instrument, perfectly well. We were quite distressed the first day that the TV was turned on that we didn't get any comment from the astronaut on the corona. I think this is a tribute to their training. They expected it to be as good as it is. They've seen it in the simulator for many months. The simulator pictures we've given them, so everything's working normally. We're very pleased with the way things have gone up to now.

SPEAKER Dr. Bouer.

BOUER We turned on our cameras on mission day two and three unattended. The camera is in the focal plane of the X-RAY spectroheleiograph, and with that instrument (garble) it looks at a corona in between the one that Bob McQueen has seen, and what the rest of the instruments have seen. Everything has worked as expected, but we started the (garble) observation on mission day 4 to 5, and yesterday we finally turned our high voltage for the flare alarm system, X-REA flare alarm system, which is a separate instrument, and in spite of the fact that these first experiments are going(garble) South Atlantic anomaly and only they most count as planned so that the switch was not turned off on that South Atlantic anomaly, I think that we got a very good response from the astronaut, or what would have been a good response if he (garble). By now we have taken some thousand frames of film, and most of them, about 200 were down through the South Atlantic anomaly thing, but most of the other 80 were done on very good scientific programs. We coordinated in fact, and we hope operated simultaneously. Perhaps most important in the number of things we've done program that we have started as early as we could, particularly

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we are very pleased with the fact that there's a very large complex of activity centered on those active regions you saw (garble) monitored that started to be started, a very pecular feature with a very pecular magnetic configuration. And it's going to tell us, if we follow it throughout, (garble) it's going to tell us about how the dynamics of those large complexes of activity develope. How the magnetic field changes as related to the plasma that we see encompassed by the magnetic field in the corona. Simultaneous with the other program which has been started, we are conducting edit all the PIs and the synoptics study of the Sun and which - and we particularly center our attention to observing the magnetic field again in the (garble) corona of the Sun as we have seen in the plasma confined by those structures. We depend to receive our data on the astronaut receiving the film and bringing it back the kind of information that is contained in the photograph. I brought here one of our rocket still photograph. You can kind of imagine what we are looking for. We are looking for a film which will last eight months, which will tell us the development of the X-RAY feature for that portion of the corona. And I'll put them on the table up there. I have several sequences of them, just a few still photos and you can have an idea what the data should look like, but in that film sequence of the (garble)

QUERY Have you all taken steps to make sure that the astronauts don't mistake some of the anomaly again for a flare?

BAUER Yes, the sensors were there to start with, on the pad there is a line which says, South Atlantic anomalies forthcoming, which, turn the switch off. At the time that we were going to the South Atlantic anomalies, it was expected, it was the first time that we were doing it, of course, the first the instrument was on, in addition it not being turned on the day before when we were supposed to be, just because we decided to wait so that the picture of (garble) in the canister would be as we expected it should have been, and all of those things were in the pad, so we have now told the astronauts that, and of course it's going to be (garbled)

SPEAKER I think it's a simple matter that we had to delay the cutting on of that particular part of the hardware because of some pressure burps we were getting in the canister and we were a little concerned about possibly corona of that particular high voltage system, so we delayed the cut on until the whole thing stabilized out, and he operated the panel without that particular alarm, for several revs and then we cut it on and it was just a question of getting the panel configured right, and that it, it's just about that simple.

QUERY What are the temperature ranges that you see with your X-RAVs?

BAUER The wavelength ranges its 3 to 60 angstrums. The temperature ranges, of course are depends the mechanics for the production for X-REA is, but roughly speaking it's from one million degrees or there about. 1.2, one million degrees up to whatever. Ten million degrees or so. At ten million degrees of course, you don't expect to produce very strong effect on the three angstrum range, but I do have a considerable _

SPEAKER I might add just one little comment to the business of operating the panel. One general comment. That is a very, very complex system the crewman is trying to operate up there. It's a very complex panel, very complex set of instruments, and I personally think the crew is doing an excellent job in the first couple of days.

QUERY Could you go into a little bit more detail about when you said you saw the relationship between the magnetic fields and the gas cloud in a particular active region?

BAUER I'm saying we are going to see this relationship within one of these fields in the gas cloud and the point is that the magnetic field which is observed on the ground is observed only for the (garble) level. Observation will give you the (garbled) we are after. The magnetic field behavior there is expected to (garble) looking at the (garbled) after the way it behaves. Somewhat similar to the one on the Photospheric and chromaspheris level in particular. From the up what we know is the plasma is confined in loop structures and things like that. We do not know how to separate it, the magnetic field from the photospheres into the corona because this simple measurements is on the magnetic field on the photosphere not sufficiently this answer if they aren't current then that is not enough to be able to separate (garble) together what the magnetic field will be. So the best way that you can hope to find something is by how that magnetic field is in the corona. Is by looking at the plasma which is confined by it, and that's what X-RAV photographs do. That is what white light photographs do from 1.5 solar radii.

QUERY Have you seen anything that helps you out? Have you seen anything already that has helped you out on this problem?

BAUER Well, as I said, we are waiting for the astronaut to bring back our film to do that. A few hints we have had from rockets photographs were enough to give us an idea on our the structure side. What kind of structure to be expected and so on. But certainly the (garble) were the got to develope in those regions, and that is exactly what is the most important problem is to look at the dynamics of it, but on a time scale which is very short, only a few seconds, we are talking of stability in that case, solar flares to a time scale of the order of seven solar rotations for the large complex solar activities up to hopefully to eleven year solar cycle, but of course we are going to have just a portion of it to go into the eighth month.

SPEAKER All right, just general questions to be addressed to any of the gentlemen.

QUERY Yes to Dr. Reeves, if you find that that network does indeed extend so high, what is the significance of finding that out?

REEVES Well, as you may know that if you come up upways from the surface of the Sun, the average temperature first starts to decrease, and then it rises very sharply. That means of course, that energy is being dumped into the corona much higher up. It's not starting low down and being radiated. If we can see the way in which this network of cells carries the energy up into the corona, then we can try to answer the question, we'll get a pretty good handle on, whether the heating of the corona is done by the oscillations that take place in the center of these cells, or whether the heating is done by energy that's carried on the network the boundry of these cells. And we can by looking at the oscillations, we can look at these things with good time resolution, we can sit on one of these and go back and forth and either get sort of 5 seconds or if we wish to sit inside a cell, we can get forty milliseconds time resolution, and we hope to see waves propagating up into the atmosphere, and try to get a handle on whether the - what is the - is there a wave motion and what is the nature of the wave motion, and where does that heating occur for the network, for the chromoshperic, sorry for the corona.

QUERY Is the idea that the heating takes place in the cells and then it's transported up by the oscillating back and forth, is that the idea.

SPEAKER That's one of the things we're trying to answer. Just how does the corona get heated. There are I guess a number of different postulates on how the energy gets into the corona, and where do they get into the corona? And there are certain observations that we can make, such as the wave motions, where they occur, such as the structure of this network, and how it changes as you go up into the corona, that will give us a pretty good idea on where the

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heating takes place and what is the mechanism by which that heating takes place, but from a couple of quick photographs. We don't want to tackle a question like that which is really one of the outstanding questions in solar physics.

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QUERY Could somebody summarize what the total of the malfunctions with ATM instruments has been so far and what the net effect of that looks like it is going to be at this time.

SPEAKER Well, we really haven't had any major malfunctions. We've had a couple of nuisances that have come up. I think in the case of the Harvard instrument, we have had a couple of tripouts of the high voltage detectors. Bear in mind that there is a protective circuit on each one of those high voltage devices which will cut the device off if the voltage - if the current actually exceeds a certain amount. And that threshold is set fairly low and we expect see tripouts every once in a while so really there is nothing to be alarmed about. It is a protective circuit and it is working, and working well. The threshold as I said is low and we have tripped out there a couple of times. There is no indication of any problem to speak of. We have had some again nuisance factors with the pressure inside the canister. Up until 2 days ago, we were getting some indication from a pressure gauge inside the canister that it was burping every once in a while and we're getting a little outgassing inside the canister. That appears to have settled down now. As Dr. Tousey pointed out, the canister has been shown to be extremely stable. Let's see I don't believe I know of any other malfunctions, in fact we are all very pleased with the performance of the instruments today. Just absolutely ecstatic, if you want to get right down to it.

QUERY All the flim in use, flim that was on the spacecraft during the prior manning and are you confident that it is okay?

SPEAKER The flim that you heard about being in trouble was all down in the workshop and we had no film in the workshop. All of our film was either in cameras, on the instruments inside the canisters, or the rest of the film which we will use in subsequent flight was in the multiple docking adapter in film vaults. We tracked those temperatures and I don't remember seeing any temperature higher than 73 degrees during other times. So we are in good shape there. Our film was very reasonable. We have an upper limit of 80 degrees and we didn't come close to that.

QUERY All right this is for you Dr. Reeves if you would try to answer this question. If you can learn how the corona is heated and I presume it would some kind of a thermo nuclear reaction, but if you can learn that process, do you believe that it would result in finding new ways to produce power or heat on Earth.

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REEVES Well the heating of the corona is not a nuclear reaction. The nuclear reaction is that produce the very large souce of heat that keep the Sun operating are produced very deep down in the center of the Sun. The heating of the corona is only from 10,000 degrees up to one or two million degrees, certainly no where near. And the density is very low so that collisions almost never take place. Thermo nuclear reactions would not take place. Collisions do not take place. The heating is probably one of shock waves where an acoustic wave produced in these super granulation cell steepens as it goes through a decreasing pressure and increasing temperature region forming shock waves which then as they get to a certain condition of temperature intensity dump their maximum amount of energy. So it is probably an acoustically shock waved kind of heating process.

SPEAKER There are lots of things that go on on the Sun, which these active regions and prominences and these surges of gas that move in the magnetic field are going to tell us a lot of good sound physics about how plasmas at high temperatures are constrained and move in magnetic fields and how they interact. And that basic physics of plasmas in motion at high temperatures in magnetic fields is of ultimate interest in ultimate application to the question of fusion and the control of fusion. But it's one sort of through the back door.

SPEAKER (Garble) experiments on fusion because now on the Sun, it takes place all the time. It takes place more or less in condition of millions of degrees (garble) the physics is quite relevant, quite important although it may not be directly applicable tomorrow or the day after tomorrow.

SPEAKER But the theory of energy mass and transfer on the Sun have to be understood, verified, eliminated and so forth before you can ever find out what the equations look like so that you can apply them. That's what the ATM is all about to collect data to determine what the theories are correct, which theories are correct, what the equations are, what the laws of physics are, and which can be subsequently applied later on.

QUERY Do you have any idea how soon after you have analyzed the ATM data when you will know the effects of the Sun energy or the Sun has on the weather on Earth, the climate.

SPEAKER Dr. MacQueen has got to answer that one because he is from the high altitude observatory which is also interested in that atmospheric research.

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SPEAKER Since we are a division of the national center of atmoshereric research, that's our charter is to try to understand the Sun's influence on weather and climate. To answer your question is I don't know. And by that I mean the direct answer is I have no idea of how long it is going to take to solve the problem of how the Earth reacts to the Sun with regard to long term changes of climate or even to short term fluctuations in the Earth's outer atmosphere as a result of solar impulsive vents. It is a major problem recognized as a major problem of atmospheric physics. And we think by understanding the structure of the corona, which actually extends throughout the solar system, and the Earth is embedded in the solar corona, that if we can understand the physics of the corona, then we could ultimately understand the physics of the passage of energy from the Sun pass the Earth and to the Earth, and that of course is the link that we need to understand before we can ultimately tie together weather, climate, and disturbances on the Earth to the Sun.

SPEAKER Any further questions?

QUERY You are pursuing the thermo nuclear bit. It seems to me there used to be an idea that they occurred in flares, that there was some fusion in the flare in the pinch of the flare. Has that gone out the window?

SPEAKER No it has not by no means. The flare is a very unusual event. The flare is a condensation of matter where the density goes up far above the local density in a corona or the transition region and the temperature also goes way up. And I think there probably will be good evidence that reactions of that type can take place on that rather unusual event.

SPEAKER Any further questions. For any other pressmen or investigators or for Mr. Keathley?

QUERY Do any of you people see anything in the photographs that you've been able, a phenomenon that you've been able to observe before, that is a surprise to you, a particular surprise to you. Do you see anything is the photography of features on which you have had some information before or some theories before, that are particular surprises to you in a quick look.

SPEAKER You are referring to previous observations, therefore a petition also for new things which may have come from ATM. I personally had the experience of a number of rocket flights spaced over the last 10 years or so pursuing the (garble) observation of the solar corona. I can state there has been no flight - that has been - at least one or two totally unexpected sort of thing. I think for instance

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during that time the general idea of the spc(garble) the description of the corona as a (garble) shell has been completely thrown out of the window. The most important thing today is the corona and in the plasma in the structure of it. All of that has come out from eclipse observation, from the (garble) rocket observation, and from X-ray rocket observation. Now these are very important things because when you are trying to do the physics of the corona, trying to understand for instance the heating mechanism, or the way that the (garble) of the sun changes, then you do tend to use the (garble) as you see them, as they are presented to you by the observations and that's more than (garble) sort of thing just 10 years ago. And since then we have had to abandon almost completely (garble) of this kind and never look into the details. We have to know that (garble) fields that is more important than we thought it might have been and so on.

QUERY When you get a result you'll almost certainly find someone who will say I could have told you that. There are bound to be at least 3 or 4 theories for each observation, and many phenomenon have been expected one way or another. The objective of ATM is sort of at the end, not the end, but is the end point at this time of a long series of solar observations, and so we've blocked out a great many of the solar types of phenomenon. The objective of ATM is not so much a discovery mission of new kinds of things but really coming to grips, theoretically quantitatively with these phenomena.

SPEAKER I should like to say the extreme ultra violet images that you looked at some of which were taken a day later than the first. On casual inspection, which is all I have done and all you have done, seem to have changed much more during that period than I had expected. It may may be just a matter of how they were taken and something to do with the reproduction, but it really looks as though the corona and the transition layer which were changing rather a lot more rapidly in details than can just be attributed to the fact that the sun is rotating. I think that this is just about the first time that we've had an opportunity to compare this kind of extreme ultraviolet image on days on a single day apart.

SPEAKER Do any of the other PIs have any other comments that they would like to make to any question that was not asked? Mr. Keathley, do you have anything else?

SPEAKER In summarizing, most of the gentlemen here are being reasonably cautious about the results of the observations because obviously they have to wait on the photographs to get back to really pin that down. Dr. Reeves

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has just received his first images from the photo electric data and I thought Dr. Noyse described the result there. And I think as time goes on, some more interesting observations could be made. We're just in the very beginning of the observations right now. As far as the instruments are concerned to summarize again I think they are working exceptionally well and I'm sure we're going to get excellent data.

SPEAKER Remember there are some photographs that will be available right after the conference and other photographs will be available in the photographic branch. Thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 30, 1973
10:07 p.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
J. Steve McLendon, EGIL
Milt Reim, PAO

Shift Briefing
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PAO All right. We'll get started. On my right is J. Steve McLendon, he's the EGIL and Neil Hutchinson, the Flight Director coming off shift now. We'll let Neil start it off.

HUTCHINSON Okay. I've already been told you guys would like - you folks - excuse me, ladies, would like to know about our electrical power system, and I'll start off with that. And then backtrack to the rest of another incredible day. Let me - I think what I'll do is kind of describe the sequence of events that happened during the EREP pass - during and after the EREP pass and then I'll let Steve, who is the guy whose batteries and things seem to be giving us a bit of a tussle here, talk about anything you want to talk about in detail. The EREP pass today, as you know, our power situation is such that we've been managing the power fairly close to the best. The way we manage batteries is we have to always pay back what we take out, if you will, and we try to do that on an every orbit basis and occasionally we'll let ourselves get in a posture where we don't quite pay back all we take out and then we make sure that the next orbit we catch up. In the case of an EREP pass, it is a case of having to wait an orbit or two to pay back what you take out. And the EREP pass today, as are all the EREP passes that we planned with the reduced power situation, we run the batteries down to the lowest level that they are run under any other circumstances and that ends up being a state of charge in the area of 45 to 50 percent. In other words, we use about half of their total capacity on the night side. to make it through the night. Now the batteries have a characteristic - they have - not a characteristic - that's the wrong word, they have a set circuitry in them that - a protective circuitry that will automatically take them off line when this state of charge or amount of energy left reaches 20 percent. It appears that an anomaly that we experienced back while Pete was still on the ground. You will remember one night - and it - I have to dig way back, but you will remember one of those times when we were flying and the vehicle around tilted up at a weird angle, a particularly high to try and cool it off, we had a power problem where all of a sudden we came up over a site and discovered that some of the regulators had tripped off and some of the batteries had tripped off. And today during the EREP pass, after the EREP pass, we experienced a similar problem. It appears to have two very definite symptoms and I'm going to let Steve talk some more about this. I'll just kind of touch on it briefly. One of them is that we apparently have

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HUTCHINSON some batteries that are tripping off at considerably higher state of charges than 20 percent. We didn't miss our predictions on how the system was going to perform or how much power we were going to use. We didn't take any of them down below 45 percent. However, we did the EREP, as you know, of course, across the States during the day, and we just got back to solar inertial. We didn't quite get back to solar inertial before we went into night. And we went LOS right then, just as we were getting back to solar inertial to Vanguard. We had about a 40 minutes LOS, something like that. Came around at Hawaii on the other side and we were in daylight and low and behold - were we in daylight then?

McLENDON Yes.

HUTCHINSON Yes. We were in daylight, Goldstone. Anyway, three-quarters of the way around the Earth, and low and behold - -

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HUTCHINSON - lo and behold - was it - were we in daylight then? Yeah we were in daylight at Goldstone. Anyway three quarters of the way around the Earth, and lo and behold during the night we had - four batteries had tripped off, which meant that the loads during the night were being shared by only 13 - well really only 12 because it turned out that five regulators also were off when we came over the hill there. Now we in since have taken a look at the data, of course we don't have any conclusions and neither does Marshall. And it's going to be awhile but we have looked at the dump data - we had the recorders running on the ATM during that time and we have gathered in the data here in the control center and looked at it. And it looks like a couple of the batteries, indeed, tripped off in the middle of the night on a low voltage trip, and they were nowhere near 20 percent depth of discharge - state of charge. The regulators, it appears, kicked off right at sunrise and we're not sure we understand that but it appears that there is some phenomemon based on the voltage surges - on a regulator, right at sunrise that's causing them to kick off and I don't think anybody really understands it yet, and we're going to have to sniff that one for quite awhile. The end result of this - well when we got to Goldstone, we tried to get the regulators back on so we could connect the solar wings onto the buses and get everything back up to normal. And of course the batteries that kicked off - the two that kicked off there and the two that kicked off at sunrise had not discharged but the other batteries had discharged excessively and they were already down anyway because of the ZLV. So the idea was to get the solar panels hooked back up to the batteries and so we could charge them and back up to the buses so we could supply power. We were unable to get CBRM 3 back on the line, and we have since tried from the ground and from the air to reactivate it and with no success. Now, the characteristic of this one is different than the one we lost the other day. We appear to be able to charge the battery, however, we can't get the regulator on line, which means we can't connect the battery or the solar panel into the power system. Now, do you want to split this up and take questions on the power system now, and I'll let Steve answer them.

QUERY So what is the situation right now? How many batteries do you have operating? And how many batteries do you have down?

MCLENDON Right now, we've got sixteen batteries that are fully operational. We've got two batteries that are still off line, and at the present state are useless to us.

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QUERY One of those batteries is the one that dropped out earlier, and then one that dropped out tonight, and you've never been able to get it back on the line with the rest of the system?

MCLENDON That's right.

QUERY You talk about four batteries dropping off and the five regulators, when you say the four batteries, you're talking about 6, 7, 8 and 16, and then you're talking about 3 when you're talking about the fifth regulator, right? Three battery is okay, regulator is bad. How will this affect - is this just another 6 percent of your power gone just like the other one, and then what do you foresee is working around that problem?

MCLENDON Well, you're right in the fact that we have lost another 6 percent of our power. As far as the CBRM 15 problem goes, the end result is the same. You can't get anymore power in to feed the electrical power system. Now, we have been talking to Marshall for procedures to try to come around this. We have had more or less the same problems on the pad, and they have come up with some different procedures that they have fixed those on the pad.

QUERY How does this impact EREP, if you lose another 6 percent? Now if you go EREP again, couldn't the same thing happen all the time as you go flip out.

SPEAKER Let me tell you about that. About EREP. At first the short term thing, we have --

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SPEAKER - the same thing happen all the time, or is it flip out.

HUTCHINSON Let me tell you about that, about EREP. First, the short term thing, we have cancelled the EREP pass tomorrow. And primarily because we couldn't turn out a flight plan that had an EREP in it that we could do a power evaluation on at this late stage in the game. Power evaluations don't just come quick, it takes you hours to make the computer runs and so on. We had a flight plan tomorrow with an EREP pass in it and later on I'll - I brought a flight plan with me. I'll give you a run down on what we've done to back off of the flight plan that we were planning on flying tomorrow to accommodate the power situation as it sits. But basically we dropped out the EREP pass for tomorrow. I don't think it in any way means we won't run any more EREP passes. In fact, I can guarantee that that is not the case. However I suspect, first off, we got less power, so we're going to have to be a little more judicious in the way we spend it, in other words, you can't accommodate as long a time out of solar inertial which means the EREP passes may very well be shorter. Ar-other obvious thing is we don't clearly understand how come the batteries are tripping off at a considerably higher state of charge. So we are undoubtedly, in fact I can guarantee it, tomorrow, we won't be planning any activities that take us anywhere near the 45 - in fact, what did you decide? Did we decide on a flight plan tomorrow what we were gonna do, state of charge wise, maximum, minimum?

MCLENDON No, that was still in work, because we still had to evaluate the alternate flight plan, it was too -

HUTCHINSON Well I suspect it won't be. It will be up in the 55. Wouldn't you?

MCLENDON Well, with the no EREP on, how about 60 or 65 percent?

HUTCHINSON Oh, you want to talk about the flight plan for tomorrow.

QUERY What can you do if you limit yourself to going to 55 percent on the battery?

HUTCHINSON Oh, we could press on very well. As long as you stay in solar inertial you do pretty well. It's that one rev of not getting those things recharged that eats your lunch. We have not made any power runs on the flight plan tomorrow, and the one big MOD that we've made, of course, is to take EREP out, and it will be several hours before we home in on a final flight plan. I suspect it will be very similar to a not - no EREP day.

QUERY What will you be doing tomorrow in

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relation to trying to understand this problem?

HUTCHINSON Well, I don't know. I suspect that there's an awful lot of people going to be doing an awful lot of work over the night and tomorrow and the next day. Basically, I think the first thing we gotta do is to look at the data awful close. It's like any other anomaly that happens. There are a lot of theories running around, not any of which I've heard. I don't know. Steve, what do you suspect we'll be doing besides looking at data and trying to understand?

MCLENDON Well, understand first, that in the ATM and particularly in the electrical power system we're very handicapped as far as that area goes, because most of the data on the electrical power system is not recorded. And we have just a few vital parameters in there that are recorded and that's where we're taking our data from now. The recorder that was recording all the events that happened during the dark side. And while all this was taking place, we did have a hot line set up direct to Marshall, where we could talk to them directly, if need be, and when the crew was doing the troubleshooting on the CBRM 3, the switches they were throwing and the reports they gave - for instance, one of the reports that completely baffled us was that the status indicator light on the panel indicated that indeed CBRM 3 regulator was indeed on. When the regulator was not outputting anything. And Marshall was in on the hot line up to there, and they got all the inputs and they were just as baffled as we were. So right now they're looking at that pretty hard.

HUTCHINSON I think there's going to be a lot of engineering data analysis done tonight, and I think, just like CBRM 15, I imagine now, since the symptons are different on number 3 we'll probably be doing - you'll probably be hearing a lot about various switching we're doing, and so on and so forth, trying to get it back. We did all the basic troubleshooting tonight that you can do to get a CBRM back, that is we turned the REG off the Charger off, the REG on the charger battery on, ec etera, and the crew did it also.

QUERY It didn't work?

HUTCHINSON That's correct.

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HUTCHINSON - - reg off the charger off, the reg on the charger - battery on, et cetera, and the crew did it also.

QUERY It didn't work?

HUTCHINSON That's correct.

QUERY What - have we not gotten down to that 45 percent before on these batteries? And another thing, is the regulator on number 15 gone or is it the battery? And is there any way, if the regulator on 15 is good, to hotwire across in any form?

HUTCHINSON Neither - well, go ahead an answer him.

McLENDON As far as we know on CBRM 15 all the components are good. The regulator's good. We know the regulator is good because we can take it on line and draw power from the battery - from the regulator. Now we pretty well got this honed in and on CBRM 15 we're fairly certain that the solar array contactor is open and we can't get it closed. So we have no solar array energy into the CBRM on that one. They've got a different case on CBRM 3 where we've isolated it down to a particular component and that is the regulator. The regulator does seem to be the problem.

QUERY You can't get them together?

McLENDON No, they are not switchable. They are dedicated to one another.

QUERY Can you continue to - in case you have the automatic controls on the four of them that you lost today, can you continue to work from the ground? Are you fully confident that you can continue to switch them back on when they go off line.

McLENDON Well, we're confident that we can, but right now, we just don't want to get ourselves in a posture where we have to do that again.

QUERY If you would have lost this second battery for the rest of the mission, how does it impact the rest of the mission.

McLENDON Well, each time you lose the CBRM you essentially take off about 250 watts with your power system capability.

QUERY Can you go into it a little more than that?

McLENDON Well - -

QUERY What can you do - what do you lose? What do you think you lose?

McLENDON As far as - -

QUERY Experiments, powering down, lights, anything, you know, heaters, fans -

McLENDON Okay. Just a short summary. We can support full up ATM operations - we can - we can support

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McLENDON full up ATM operations. We can support all of the corollary, all of the biomed experiments. And keep in mind that you have to stagger these somewhat so that they don't hit you all at once. One of the things that I have great doubts about now, is 120 degree EREP passes. Those have to be looked at real close from now on. But as far as the solar EREPs go, then, yes, I have full confidence that we can make those.

QUERY What about housekeeping and running the - running the workshop?

McLENDON That's already been baselined into our loads that we have on already.

HUTCHINSON Do you remember I told you that we passed out numbers like 4500 watts and like we're running around 4000 average and when we get this thing really tuned up, we've been pushing it up around 4400 or so. Now the solar system supports - there's a little bit of pad in the 4500 number and it's up probably when you push it up around 4700 watts. And I kind of look at this one like we lost all the pad we had, but you know, that 4500 number is now yes, it's getting to be like the kind of number you use. Instead of one you feel very comfortable with, it's one you now get squirmy about. I don't think this particular failure in itself has jeopardized a single thing. However, it's - you know, one nickle and one nickle make ten cents and et cetera.

QUERY Let me just ask one more part of that question. Does this make it all the more urgent to get that - to try to get that solar panel out now? And will you try anything before day 26? Are you thinking of it anyway?

HUTCHINSON Well, I don't think it changed the urgency or the desire. Well, it obviously has to lend some impetus to the urgency, if you could call it an urgency. I think that everybody is looking forward to the possibility that we may be able to get the panel out sometime during Skylab 2 and toward that end there are a lot of people working.

QUERY How many batteries can you afford to lose before you have to come home, then?

HUTCHINSON Well, Steve just gave you the - I mean you can kind of figure that out for yourself. You know, it's cost you 200 watts - 240 - how much - 250?

McLENDON 250.

HUTCHINSON 250 watts for everyone you lose and you know we get down to a couple of more and we'd be in a posture where we'd be just pushing it every single rev just to support the on-orbit type of operation. And you know so - you

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HUTCHINSON can just kind of add, you know, every one you lose you just subtract 250 watts and you folks know about the kind of power loads we've been using to run the cluster.

QUERY How - I don't get a picture of these batteries in my mind, you know. How big are they and is there any way to resupply either components or the batteries on another mission?

McLENDON No.

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QUERY I don't get a picture of these batteries in my min. You know - How big are they, and is there anyway to resupply the components with the batteries on another mission?

MCLENDON No.

HUTCHINSON He wants to know how big a CBRM is.

MCLENDON Well, a CBRM, I guess if you take one of them, it would measure about this long and about -

QUERY That's the whole thing now, the charger, the battery, the regulator?

QUERY Two feet?

MCLENDON That's right. About that.

QUERY Can you do repair work on one? Are they so - the thing so contained that it's no way to work on it individually?

MCLENDON Well, as you know, they're all- 18 CBRMs are located up on the ATM canister, and when they are installed they are all hermetically sealed and potted, so there's not very much of a convenient means, even if you could get them apart, because they have all the potting material in there, to get in there and do any kind of repair work on them.

QUERY Neil, are you starting to lose a little of your optimism in the flight. You seem to be a little more twitchy each day.

HUTCHINSON I'm tired. Would you believe that I get two days off after this. I mean, I ended up with a real smash over there today, so I'm gonna retire.

QUERY How many problems are all being on-worked right now? How many anomalies are being on-worked?

HUTCHINSON You mean between - all told? The experiments and support systems? Bruce, I don't even know whether I - I don't know - I couldn't give you an accurate count. You know, it's a tremendously big vehicle. And, frankly, I don't think there are any more anomalies than I would have expected for the size of the vehicle it is. You know, every time - I think a lot of the things that you would class right now as anomalies, two weeks from now won't be. It's just that we still haven't understood the exact nature of the beast. Like all of these things that are going on with the EREP. I don't think - I think you're going to find that when we finally get that thing squared away that a lot of those turn out to be just little things about the way EREP works that we didn't quite understand. You know, and there are three or four of these biggies, you know, that we've been chasing, but and a myriad of little ones, but I just don't think there are any more than one would expect for the massive number of systems that we've got to contend with.

QUERY Neil, the time that the one tripped when you said you were up in that wierd angle. was that at 45 percent.

HUTCHINSON No. That was, if you'll recall, the time we got into that little problem, was one of those times when we were doing a cold soak, and we had maneuvered up to 65 degrees pitch, which is, you know, way up there. That's not - you remember we were flying at 45, and then a couple of times there towards the end, we did this thermal shock maneuver to try and give a big thermal impetus to the workshop by going on up very, quite a bit more. It was during 2 revs of that that we got into this situation. And I would say that, would you not say that's the only other time that we've driven the batteries down as low as we did today? That's the only other time we've driven them down as low as we did today with EREP.

QUERY I had another part to that. Did I understand you to say you also had this problem on the pad? Or you mean, did you refer to while the crew was on the pad?

MCLENDON No, during one of the pad checkouts down at the Cape, when they were running through their initial checkouts, and they were trying to do some check-outs on the CBRM, they noticed they could not close the solar array contactor on the same CBRM - CBRM 15, by the way. And, you know in the ATM C & D area they have a little digital address system, where they just dial in a function code and it's essentially the same as our command system down here. Well, they were using that as part of the checkout and they noticed that they couldn't get the contactor closed. That means, they couldn't command it through the digital address system. And they found the only way they could get the contractor closed was to cycle the on-board switches that they have for that function right there, and if they're cycled those a number of times, they did have success in closing the contactor.

QUERY I have two questions. How would the crew --

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MCLENDON - a number of times they did have success in closing the contactor.

QUERY I have two questions. One, how would the crew deploy a TV camera out of the minus-Z SAL to take a look at the wing? And also, what other systems not including experiments, are you having troubles with up to this point right now?

HUTCHINSON Okay, on the minus-Z SAL thing. Oh boy, we have - Well, let me tell you first, I'm not intimately familiar with it, but there's a standard procedure with a standard set of equipment already on board to put a television camera out the minus-Z SAL. It was - I mean out the plus Z SAL. Of course, the SALs are identical. We had a prearranged pre-mission plan to use a television out the SAL for EVA, out the plus-Z SAL. That was a planned thing. And we are, as you mentioned now, discussing as part of the possibilities of a solar wing repair, sticking a camera out the minus - the same camera on the same mounts, and it's a system very similar on rods that you push out with a camera on the end, very similar to the parasol device. As a matter of fact, I really don't know whether it's the T027 booms or not. I'm not sure. But it's like that anyway. It's the same principle. And there are some people looking at the possibility of putting it out the minus-Z SAL and turning it around and looking right down into the wing that we have partially deployed, to get a super good look at the - where that piece of meteoroid shield was up over the wing. I think that's a distinct possibility. I fully expect us to do something like that in the next few days as a scheduled flight plan task.

QUERY What about the other systems?

HUTCHINSON Systems we're having problems with outside of the one that you - Oh boy, that's going to be hard to recall. Steve can help me, cause they're mostly his. The - We've had, of course, as you know, we've had some uncertainty about the drift terms, and the RATE GYROS and the APCS, and we think we're homing in on that. However, another one of my fun things today during EREP pass, we had another RATE GYRO failure. RM, redundancy management, calling one bad again. I don't think we quite understand that still. It looks like now, maybe the RATE GYRO drift terms are connected in some way with maneuvering. And if you know anything about gyros, you know that gyros have two kinds of things that are bad in them. One, they have constant drift, and two they have drift that's g sensitive. And it's commonly called scale factor error and it never

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shows up unless they're under a measuring rate, a significant rate, and I wouldn't be surprised if we've got some scale factor problems with the RATE GYROs, and I don't think it's anything that we can't cope with. So that's the only one, well, that's one in the APCS. The other one that we have in the APCS is this Fine Sun Sensor - UP/DOWN thing that's not working, and again I don't think we've had enough time to look at that one. I'm not sure that things broken either. I wouldn't be surprised if we just don't understand it yet. There's some possibility the prism may be have turned 180 degrees, and we may be looking at the back of it, and all we have to do is drive it back around, and I think in the next couple of days, we'll be getting at that one. We've got - you want the rest of them? Two CBRMs which you know about. We have a pump in the - pump inverter 1 in the secondary coolant loop. We've had some little dingelberries, like a fire sensor here and there and a I think for the systems - can you think of anything else? vont valves 1 are --

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SPEAKER the systems, can you think of anything else?

SPEAKER Solenoid vent valves 1 are - 2 and 4?

SPEAKER One and 3 are open.

SPEAKER One and 3 telemetry indicates they're open. You know those are the two that have their two series parallel arrangements in the back for venting the cluster down. I think that's about it. And boy that's not very much when you think of all that stuff.

QUERY I've got three questions. Number 1, what's happening to the temperatures in the spacecraft? When they did have this failure with the array regulator on the pad, did they change it; and three, are there any mission rules with regard to the number of batteries that can fail before you say you're going home?

SPEAKER Well. I'll answer the first one. What was the first one again, I - I'm very tired. I'm sorry. Oh, yeah, temps. Okay. We came down, as pretty much as expected, last night a couple of degrees. We didn't come down today during the day as expected. We just hold our own about during the day, and I figure we'll come down a degree and a half or so tonight. I don't see anything that leads me to believe any different other than we're probably going to end up right in an 80-degree neighborhood, like I told you last night. It is still coming down, and we lost a couple of degrees over the last 24 hours.

QUERY It comes down at night and then levels off during the day when the activity goes down, and then comes down a little bit more at night and levels off.

SPEAKER We're not making anything during the day, but we're not losing anything either, and that's very important - not to lose things during the day when the crew is in there working. Because that means we still haven't found the equilibrium point yet. Now when we get down closer to equilibrium point, we'll begin to see us gain a degree or so in a day and cool, and you know, we'll bounce like this. But we still are going like this at the moment.

SPEAKER Your second question regarding the checkout at the Cape - no, that was not changed out, and the reason it wasn't changed out is because they were able to operate it successfully, and there was no intent they were having that contacter open. So they felt that once you had it closed in a nominal configuration, you didn't have any reason to suspect other than a nominal mission that we were going to have, that it would be okay the way it was. And we figured that if we ever did have any problems, that we could repeat the procedure on board in flight. And your third question. No, there is no mission

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rule that says concretely how many CBRM's you have to lose. Again you get into the management game here. We had allowed in all of our pre-mission planning - of course, this was assuming you had an airlock power system to start with. But we had allowed for four CBRM losses. But, obviously, if you get down to that point today, you're really going to be severely hampered. But whichever one you lose, that just says you have to play the management game just a little bit more.

QUERY Any problems in the food area today? And in the power management, is there any possibility that you would cut down on the amount of heat that the crew could use to heat their food?

SPEAKER No problems with the food that I know of. In fact, I don't know if you saw it - there was a meal prep on it today. A meal prep and eating on one of the televisions that they downlinked, and they looked like they were enjoying it. The answer on curtailing the food preps in terms of power considerations - it's sort of yes and no, definitely not to where it affects them eating hot food. However, we're doing some things that cause us not to use so much heat. For example, we take the food out of the freezer 12 hours earlier like you would do at home if you wanted to thaw out a roast. You'd set it out on the counter for half a day, and therefore it doesn't take so much heat to heat it up. And we're doing some rehydrating with hot water and some things like that to minimize the amount of power it takes to - it's eating with minimal power, but as far as having them eat cold food or anything of that nature, no, and there are no plans to do that.

QUERY Well, if you find yourself in this situation from here on in, regards the extra battery out and the -

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QUERY Well, if you find yourself in this situation from here on in as regards - extra battery out. And the situation where you can never really solve whether these things are going to kick out at 40 or 50 percent, aren't you pretty much confined then to shorter your EREP passes?

SPEAKER Yes.

QUERY Will there be an effect on the amount of TV, as a result of the power problem? I mean, will there be less or more recorded as opposed to live or what?

SPEAKER I don't really think so. I really don't look for, with this particular power thing that we have, and I don't look for any particular big curtailment in the flight plans, other than a little more careful management of the things we put together at one time. And I don't think it's going to - I don't think you're going to see any marked effect in anything, and TV included. I think there will be just as much as there was planned.

QUERY Has any more consideration been given to Pete Conrad's crazy and wild and good idea, I suppose, of going hand over hand onto the wing with the pry tool and trying to break loose the wing? As Friday's their day off, I've got to presume that there's a possibility he might be able to go out by Friday if Rusty figures out a way for him to do it at Marshall.

SPEAKER I don't know what's going on with the EVA plans. Honestly I don't. I've been so busy over in the place that I don't know what's going on with the EVA plans. I am sure that Pete's comments have been and are being continually factored into the planning that's going on on the ground. Now how we conduct an EVA out there, I think that remains for Rusty to figure out up in the tank at Huntsville.

QUERY Well, just following that up, I wonder, do you feel or have you any personal preference to push ahead with an EVA now? And apart from that, you haven't had a chance yet to give us a rundown on the day. Can you do that very briefly without going into any detail?

SPEAKER I don't really have any personal preference on an EVA. I think if and when we do it, it's going to cost us a day of flight plan activity. I think probably we're just going to have to wait and see if it proves to be feasible. I suspect that if it proves to be feasible, we're going to do it. I don't really think there's any question in anybody's mind if it's a fair certainty that we stand a good chance of getting that wing out and it's a safe procedure to accomplish, I don't think anybody has any questions that we'll try it. Now as to when, there are lots of things that might influence that. You know, if we get in more trouble with the CBRM's, that's obviously got to influence it. Because like Steve said, we're going to get to a point here where we're going to

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end up having to start curtailing experiment operations. And I just don't have any thoughts one way or another - preferences one way or another. As far as what went on today, we had another day of some new experiment operations. You know we started up the chair today for the first time and it worked good - well. I had to cancel the chair run on the SPT tonight because of the power problem. We lost it - we did some quick and dirty pulling things off the line until we could get the batteries back up to snuff. And one of the things that we dropped was the M131 run on the SPT tonight - or this afternoon. Anyway, we started the chair up today. The other big experiment that we started today, or tried to start up, was S019. That's the stellar astronomy experiment. We had a problem with it. We were not able to operate the experiment today. The problem appears to be - the thing has a very fancy - it's not fancy - it's really a fairly simple device. It's a mirror system on the end of a kind of a - it's an elliptical-shaped mirror, about that big around - -

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SPEAKER It's an elliptical-shaped mirror about that big a round that is used as a light director to direct starfields or starlight into the opjtcal system. The mirror has two degrees of freedom, it tilts up and down and it rolls 360 degrees, and you put it out the scientific airlock and extend the mirror away from the SAL. It goes out about this far, oh, about 4 feet I guess and then you can sortof fly this thing like you can optics in the CSM. It has a roll and a tilt. Turns out that the roll and the tilt are not working, and the roll is sort of working but it's very sticky and the tilt is not working at all and it appears that the tilt wheel, the tilt ajustment on the canister, is freewheeling. It has a clutch in there between it and the gear train; and the gear train is stuck fairly solidly. And we haven't got the - we don't know what's wrong with it. They have had it back in the cabin and they extended the mirror in the cabin. You can - they took it out of the SAL and brought it back into the experiment compartment and opened it up and extended the mirror and looked in there. We have a procedure that's being worked on tonight, in fact we have a S019 over in the control center. We were fooling around with it over there today trying to understand what might be wrong with it. It looks like there's something jammed in the gears, is what it looks like. If the thing, of course, this mirror system is also the mirror system for the French experiment, the S183.

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SPEAKER and what might be wrong with it. It looks like there's something jammed in the gears. That's what it looks like. If the thing - of course, this mirror system is also the mirror system for the French experiment, the S183. It's not clear yet what implications, if we don't ever get it working, it has on the two experiments. They're obviously not completely lost because there is nothing wrong with the optics. And the fact of the matter is, it will limit what you can look at if you can only roll the mirror around and not tilt it back and forth. So we've got S019 started anyway. We did run the EREP pass today. And again there were several things, as there were yesterday, in the checkout in the EREP area that we didn't quite understand. I think we probably had a reasonable - I think we had a reasonable EREP pass for the first go at it. I think there's going to be a lot of people thinking about some of the indications the crew saw and talked about, and the crew is going to say some more about the things they saw. As you know, we don't have any instrumentation telemetered to us on EREP; so we're completely dependent upon the onboard instrumentation - what the crew has to say about how it worked, to figure out what's right and wrong with it and whether it's healthy or not. So it requires a considerable amount of interchange and interplay between us and the crew. And the pass was late in the day today, and we haven't had a chance to really sit down and chew about that one. We ran the ATM today. I saw some fantastic ATM pictures. I don't know whether you saw those. I saw S052 for the first time - the white light coronagraph, in the Control Center. ATM operations are going well. We had one little - a couple of little glitches today. S055 - one of the high voltage power supplies acted up, and we have chosen to take the conservative approach. I don't think there is anything wrong with it, but we've taken the conservative approach, and we've turned it off for now, and we're thinking about it. And I'm sure we're going to be turning it back on and doing some extra looking at it tomorrow. S082A has a couple of malfunctions. In the panel, the READY light is on all the time, and the frame counter doesn't seem to be working. Other than that, I think ATM is working fairly well. While I'm on the ATM here, I have a question from Lee Merribub - Merribub, are you here? Do I answer this now?

SPEAKER Yes. Go ahead.

SPEAKER She wanted to know if there was a flare observed today, or was it the South Atlantic Anomaly? And if it was the anomaly, how could this possibly be confused with the solar flare? A flare was not observed today. It was the South Atlantic Anomaly, as best we can figure, and it's very

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easy - there are some sensors on board, X-ray event analyze - let's see, I don't remember which one it was, but the flare alarm went off, because the crew did not turn it off prior to going through the South Atlantic Anomaly. They just missed the line in the checklist, that's all. And the flare alarm went off, and they thought they had a bigee and went running to the console. And it turned out that it was the South Atlantic Anomaly. So we didn't get a flare today. However, we are going to get one. That's about it for the day.

QUERY When are you going to have the fire drill?

SPEAKER Tomorrow, just prior to dinner, and as a matter of fact, just before I left, Pete made a comment about that and said, "Well, hey, you know we've had a couple of fire drills up here, and we've sat down and talked about them and what we did and didn't do and -" However, he agreed it was a good idea to have a couple more, and it's scheduled in this Flight Plan for tomorrow at about 0100 Zulu, which is late in the afternoon, late in the evening.

QUERY With all the other things they're doing here, have they kept up with the housework?

SPEAKER Yeah, I think they're learning how to do that. There still is quite a bit of housework to be done, and we're leaving them - trying to leave them time in the flight plans to do it. We still have things like - they're still getting suits stowed, clothes hung in the closet, as it were. There is a lot of vacuuming around to be done. In all seriousness, like the habitationary event port we know is still -

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SPEAKER ...clothes hung in the closet as it were. There's a lot of vacuuming around to be done. In all seriousness, like the habitation area vent port, we know, is still full of junk. They haven't had a chance to vacuum that out. Have they, Ed?

ED No.

SPEAKER And - but I think they are keeping up the housekeeping pretty well. And we very deliberately help them. We have a lot of scheduled things that we actually put in these flight plans to try and keep things fairly coherent from a biological contamination standpoint in there - and just general living.

QUERY Does their vacuum draw power from the -

SPEAKER Yes. Yes, it does. How much?

SPEAKER It's about 110 watts.

QUERY And that hasn't been a consideration for not getting it done?

SPEAKER No. No, no.

SPEAKER Take one more question over here.

QUERY Does it appear feasible for them to have Friday off at this time? And Pete commented on running around that he was doing. I can't quite visualize that and didn't see the TV. Would you explain it briefly?

SPEAKER Yeah, I can explain the running around. He hasn't done it on television, but I guarantee we'll see that on television sooner or later, cause it's got to be something interesting. The - you know where the water tanks are? The water ring? Well, they - Pete apparently has developed a technique for - It's like a ball and a string; if you whirl a - centrifugal force. And the idea is to get started. And once you get started and get a little speed up, you can - you're forced against the wall, and you can actually, literally walk on it as if you were in 1-g. And faster you go, the har - you know, the firmer your footing is, so to speak. And apparently they've figured out a way where they can - by the way, this was discussed premission - whether such a task - jaunt would be feasible or not, and it's been a topic of conversation around here for quite a while. Starting out on his hands and knees where he can slowly crawl, and then when he gets up a little speed, he kind of gets half way to a crouch and goes a little faster. And pretty soon he's fast enough to where he can stand up and they're able to go around the water - the water ring up there. And it's like riding the bicycle, I guess you'd call it.

QUERY Well, in effect he's creating gravity of some sort. It isn't gravity; centrifugal force I guess is -

SPEAKER Which allows him to walk in a normal manner.

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QUERY ...said he was going to do somersaults or something or - I don't know if that was the same part of this, but he says he is working up to that, which didn't make much sense based on -

SPEAKER I'm - I'm not sure I copied that part of it. Of course, as you know, they've - they - somersaults are easy to do in that -

SPEAKER He tied it in with that.

SPEAKER He may have been talking about stepping over something that's in the way as you go around there. I'm not sure.

QUERY The other questions. It looked like they are going to have Friday off at this point?

SPEAKER Yes.

SPEAKER You have anything else, Neal?

SPEAKER Well, I - there's some questions here.

SPEAKER Well, I think you answered the one on the food.

SPEAKER Yeah.

QUERY What countries outside of the US were covered by the EREP pass today?

SPEAKER I - there were a couple - three countries in South America, and, gosh, I'm not sure. Columbia, - there were three of them. That sounds right, and I'm not really sure. You ought to get them an answer on that, Bill. I'm not sure. There were three countries outside of the US, and they were in South America. And I've already answered the one about the food heater. The food - the fact that were - the question says, what effect does the fact that you're having to trade off power have on the mineral balance experiment because you are not heating the food? Well, we are heating the food, and it has no effect whatsoever on the mineral balance experiment.

SPEAKER Okay. Thank you.

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Earth Resources Briefing
Johnson Space Center
May 30, 1973
2:00 p.m. CDT

Sponsored by:
American Institute of Aeronautics and Astronautics (AIAA)

Participants:

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(paper presented by Joe M. Kennedy)
J. B. Webster, Vice President, Kirby Lumber Co.
Dr. Richard Phelps, Anderson Clayton and Co.
George Specht, Martin Marietta Corp.

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WOOD I'm Loren Wood, Chairman of our activity with the AIAA that's sponsoring this press conference. This is the first of a series that we'll have throughout the Skylab Missions. At various times, when it seems appropriate, when your media are available, or might be available here with us. The next one will be during entry, when we'll be high-lighting electronics applications, as they relate to the Skylab Mission. Today our presentation is in the area of Earth Resources and, particularly earth resources applications and with some of the actual users of Earth Resources information here with us. The Chairman of this acitivity is, Mr. Gordon Heath of Lockheed and of AIAA. And I'm going to turn it over to him to introduce the rest of the program.

HEATH Thank you, Loren. For most of you, the Space Age began when the Russians put Sputnik into orbit. But for those of us who have spent most of our lives in the Earth Resources business, it only began in earnest when man turned his eyes away from deep space and turned his attention back to Earth again. The first important study of the Earth from space was done by Apollo 9, when multispectral cameras were used with great success in 1969. The Earth Resources Technology Satellite called ERTS was launched a little less than a year ago. And has been even more productive. It went a step beyond Apollo 9, by putting an electrodes - - These earthbound sections, you don't hear a great deal of, because they're pretty mundane, but they're probably just as important as these elements in space. Back on Earth there are many kinds of Scientific Specialities, which will be taking raw data, and turning it into information of value to mankind. The agriculturalist will determine where crops are plentiful and where they're scarce. We have large agricultural companies such as Anderson Clayton Company, which have an interest in this area. And here today from them is Dr. Richard Phelps, sitting in the center. Could you raise your hand, Dick. He's their Chief Agronomist. Foresters will determine what volumes of timber are ready to cut. Lumber companies like Houston, Base, Kirby Lumber Corp. are interested in this information. Their Manager of Corporate Affairs, J. B. Webster, here beside me on my right today. Geologists will be looking for new sources of energy, minerals. And the Halbouty Company of Houston, has a deep interest here. And Dr. Mike Halbouty had planned to be here, and unfortunately he was called away on other business, the last minute but he will be available at his office in Houston. And I think would be happy to talk to any of the newsmen present, who would like to hear what he has to say. He has some very strong opinions on what can be done. Many other diciplines like hydrology, oceanography, urban planning will also be using this data for the benefit of mankind. The three subjects mentioned here, will be introduced by brief technical discussions by three JSC specialists, George Specht, sitting second on my right, here, of Martin Marietta. He'll be discussing agriculture. Myself Gordon Heath, Lockheed, discussing forestry, and Joe Kennedy to the far right of me here, of TRW, will be discussing geology. Following each of these discussions, the panelist will have an opportunity to tell us how remote sensing of space may affect their operation. Maybe, be then, be questioned by the press. I think we should call on Joe, first, to present his problem.

KENNEDY Well, I'd like to talk about geology from the (garble) and somewhat general point of view. I'd just like to point out one thing. Geologists have been using remote sensing for a long, long time. Since the Civil War, as a matter of fact, when the military first used a camera on a balloon to, I don't know how you do this, Gordon, when the military first used balloon to use a camera to look at the southern lines and how they were arranged. Geologists began almost immediately to look at these photographs from a different point of view. And looking at the Earth's structure, because they could get above things, and they could see them much better. And since the Civil War and since cameras have progressed, geology and the understanding of the structural significance of the Earth's crust, both from a scientific point of view, and from a natural resource point of view, have progressed almost side by side. You can almost draw one to one correlation between photogrametry and the history of geology, and the success of geology. I guess probably the most outstanding example of the success is the 1950 series, when geologists were looking for oil at such a ferocious rate, and the petroleum companies were growing at ferocious rate. They were so successful that they actually worked themselves out of a job. By 1959, 1960, there was - oil was a glut on the market. The prices of oil were probably at the lowest point in their history. The great fields of North Africa and the Arabia, the Near East was discovered, and oil was every place, it looked like. And the oil companies cut way back on their exploration, and in the sixties they cut back very far. Dr. Halbouty was going to talk to you this afternoon about the effects of that cutback, and he stated in his little press release, there's a four page press release about what he thinks about space imagery, where he predicted in 1965 that in 1973, we were going to have an oil crisis, because we were not blocking out enough future oil for the industrial growth in the community itself, it's growth factor. Newsmen have been reporting, I guess, on the spectacular things that happen

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in the world. And we've gone through a series of things, called the atomic age, then we went through the space age, and I quess we call this the environmental awareness age. And all the time that this has been going on, there's been a very strong revolution going on in the Earth sciences. Sea floor spreading was discovered. Continental drift was all but proven to be factual. The magnetic structure around the Earth has found that we had a big magnetic tail hanging out that no one recognized before --

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KENNEDY continental drift was all but proven to be factual. The magnetic structure around the Earth - was found that we had a big magnetic tail hanging out that no one recognized before, gravity anomalies that we've never seen before. And probably when people look back on this period of time in the early space missions they'll probably talk about the revolution of Earth sciences in the last 20 to 40 years more than they will in the atomic age or the space age or the environmental awareness age. The reason for this is because almost anything that you can talk about is dependent upon man's ability to understand geology, the geophysical environment that surrounds geology, because that's the ultimate source of all of our resources. I want to mention one thing because as a geologist working in the space program and it kind of upset me a little bit. There was an article that appeared in the Houston Post that said that Skylab will furnish more pretty pictures from space. One of the things that we've got to realize is that pretty pictures to the newsmen and pretty pictures to the general population mean a lot more than that to the hydrologist who's looking at various sources of water, how to manage water better for people. He looks at the picture and he sees management capabilities that never have existed before. The people in forestry look at those pretty pictures and they see things in the area of forestry that people have never seen before. They don't mean pretty pictures to them. They mean development and management of their natural resources - trees. The same thing is true of the meteorologists. I think that the news media has been a little remiss in not giving NASA proper credit for the ability of the weatherman to predict weather because it's almost totally dependent upon the satellites and the ability of the Earth's scientists to analyze what the imagery shows from satellites. I have one slide to show this afternoon. I won't bore you with a whole bunch of pictures and things. If I could have the slide. This slide was generated by Mr. Doug Carter who works for the US Geological Survey. This little inset here represents a picture from ERTS which is really the precursor to Skylab and is actually testing some rather simplified instruments compared to what is on present day Skylab. Doug Carter just took this one image which is 100 miles on a side. We're looking at 10,000 square miles of space here which I wish we'd had in 1958 when I was working in the African desert. But you'll notice this little structure right here. That's only 20 miles from Reno, Nevada which sets about right here. It's actually shown on this map here. Now in the Gold Rush Days of the 1840's - 60's this area was crawled over by all kinds of gold miners and silver

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miners geologists, mining engineers. This structure was never noticed. Again in the search for geothermal energy in the late 1960's, again geologists looked all over this area because there are some known mineral springs right here. It wasn't until the ERTS imagery was arrived at that we saw this actual structure here. We now know that the geothermal springs are located right there. Comparing this imagery that we see here with the imagery over Italy and looking at the Lardelero geothermal area which produces one third of the electricity in Italy, we see that this structure is almost identical to it in the Lardelero dome. It produces its steam all around these edges here. No geothermal energy has ever been produced where they have not drilled into a fault structure where you can actually see what many people call liniments in the space photography and geologists, we generally call them fracture zones or faults systems. No geothermal energy has ever produced where the well does not terminate in a fault zone, where the fault reaches down into the magma or the hot rock area. You'll notice that on this geologic map here where Doug has drawn some cross-sections here, that we see several liniments - several faults that intersect this punch dome. The potential for geothermal energy in this area is very great. As a matter of fact, the U.S.G.S. has now classified this as a known geothermal area and probably will require bids for any property that's developed in that area for geothermal energy. I think that's about all I'll have to say except for maybe mentioning Dr. Bill Fisher from the U.S Geological Survey. He and several other people in analyzing early Gemini pictures and some of the pictures - I'm sorry that was not Gemini - the early Tiros pictures and later on Itos pictures of Alaska, have almost revamped the map of northwestern Alaska - the terminus - the western terminus of the Brooksrange. That area was practically unknown and they looked at the space imagery and they found lineations that no geologists has ever seen in Alaska before. And they also saw that the south of Point Barrow, an area which looked like an oil province - a new basin area, essentially an area of folds and faults systems that we knew nothing about prior to that space imagery. Now the U.S. Geological Survey has had somewhere in the neighborhood of 100 geologists looking at Alaska for almost 80 years and none of these structures were ever identified. The full belt that they located south of Point Barrow looks as though it's going to be a very, very major oil province. No one can predict that in advance. That's gotta wait for geophysical exploration and detailed shooting. But one of the things that it does is it points the direction for oil people to look and use some of their six to eight billion dollars that is spent annually in the search for oil in the continental United States. That doesn't include foreign operations. So if we can direct the activities and where that money is spent to better find oil production or geothermal energy, we've really done a fantastic job. And not only conservation of natural resources, but conservation of dollars, which is very important to the U.S. at this time. Thank you very much.

SPEAKER If you have any specific questions on geology to put to Mr. Kennedy, you might put them now. But please save more general questions until the end of the program and we can have a more general discussion on remote sensing.

PAO Anyone have a specific question?

KENNEDY Yes.

QUERY Could I just make sure I understand you correctly. You referred to a fault in Italy that produces 1/3 of that country's geothermal energy. Did you mean geothermal energy that's already been tapped or simply energy that is there and could be tapped?

KENNEDY No, the - that's not a single fault. It's a punch dome very similar to the one that you saw - a circular structure there that is cut by a fault. It's the Lardelero punch dome area. There's several towns built around this. It's about 30 kilometers in diameter and there are I think about seven separate thermal electric plants around that punch dome that produce electricity. It's the Lardelero punch dome and where the faults intersect that, it produces the energy in Italy and that produces about 1/3 of the total electricity in Italy.

HEATH Let me go on then, to the subject of forestry. As a young man I started my career by dragging a surveyor's chain through the swamps and timberlands. And you can imagine the sense of elation that myself and my compatriots felt when we suddenly graduated to the use of aerial photographs and we could sit in a comfortable air-conditioned office in an easy chair and look down on the domain of the rattlesnake instead of walking through it. Now we have taken another great step by graduating once again to space imagery. And again a sense of elation because of the much greater and broader extent of the coverage. Our work in the last year has been largely with ERTS very much in preparation for Skylab. And we have a team here at JSC which has been working on ERTS imagery and tapes - -

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HEATH - and we have a team here at JSC which has been working on ERTS imagery and tapes for their use in timber surveys. Could I have the first slide, please? This shows the study area that we have used as a test bed because we have a great deal of information on this part of the Sam Houston National Forest some 50 or 60 miles north of the city of Houston. I need the next one please, now. I guess we got those switched around a little bit, I wanted to give you sort of a general look at the ERTS satellite and the type of footprint it presents on the Earth. It has a scanner which outlines an area some hundred miles square and it did have an IBV system which isn't - is not operational, so we've been depending almost entirely upon the multispectral scanner. And of course having access to this scanner gives us a fine preparation for the use of the scanner on Skylab. Another slide please. We're producing rather detailed maps like this one in which we can distinguish up to 15 forest types and features with this scanner material and this is a map of that study area that I showed you a moment ago on the Sam Houston National Forest. Next please. We're attempting to take one giant step beyond these hand drawn maps by going to computer maps. This is a map drawn by a computer and this is of course is going to save us a great deal of time because anything drawn by the hand of man is very expensive to produce. And so this looks to us like the step into the future. Next please. Composites of the imagery again produced by computer technology, make it possible to identify quite small objects in the imagery. Those two black spots that you see on the center are 10 acre lakes and it's also possible to pick out pine stands as small as ten acres. And there's some very small lakes up in the - upper left corner there that are as small as two acres. Next slide, please. This is another type of composite and we show this particular one because it reveals something to us for the first time that was quite interesting to us as foresters. It showed the effects of a light ground fire. I think I better point it out to you. This is the effects of a light ground fire right here about 100 acres. This comparison with what you've seen before is this steady air that we saw in some detail. Now a light ground fire is quite surprising to see because it does very little damage. This was inintentionally set by rangers to clear away the underbrush before marking the timber for sale last fall. And we picked it up first on aerial photography where the weakening of some of the trees made the imagery of the pine needles change from the red, which is normal with infrared color, to a sort of a pale green. Here on this ERTS imagery it appears as a black smudge on the otherwise red healthy pine timber. Next slide please. Here are some ground photographs that I took this spring to check and see what damage actually had occurred in this burn area. And on the right you see the hottest part of that fire where some of the trees are actually killed, but the majority of the burn was as you see it on the left with very little damage occurring. And those blue spots on the tree trunks are trees marked to remain after the cutting. Next please. Now what does all of this mean to foresters as lumbermen? First of all, it means that they are going to, in the future when we develop an operational sattelite, have a continuous flow of up-to-date information which has never before been available to them. This will give them a new management tool so that they'll be able to better manage timber lands. And better management will balance supply and demand hopefully and help stabilize lumber prices and if any of you have tried to buy a house recently, I think you'll realize how important that item is. This brings my little discussion to a close. Are there any questions on this subject?

QUERY I wonder if you'd tell us some of those 15 types of forest features that you can distinguish - you don't have to numerate them all but give us some for instances and I'm also curious why the hardwoods are red and the pines green in one of the pictures you showed us?

HEATH That was just a computerized map and we could have the option of selecting any color that we wanted to to represent the various timber types. So that was just our arbitrary choice of red for hardwoods. In that particular area, some of the types that we recognized were pine, hardwood, mixtures of the two, regeneration areas where the forest service has cut timber and then replanted it. And then we followed it through several stages of regeneration. First of all where it was just the pine cutting and then where they sighted and prepared by heavy equipment for the planting and then eventually the young trees coming through. And we picked up features like roads and right of ways which really surprised us because the computer actually was able to distinguish between highways and pipelines. And this, to us, we felt was quite remarkable. Then of course we picked out bodies of water and agriculture and other land use patterns which help us differentiate forest land. Any further?

SPEAKER Let me introduce, then, Mr. Jim Webster to express his thoughts on the subject.

WEBSTER Well, really I feel sort of overwhelmed with the company I'm keeping because they kind of brought me in as tame coon to show me this thing and say what do you think about it? That blew my mind right there. One of the things that has impressed me most about this whole thing is the fact that as has been pointed out many times in recent years, the

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Earth is a closed biosphere. We have a little spaceship barrelling along in space and what we see here is what we get. And recognizing that - what's happening here in this Earth Resources Survey thing is in my opinion, one of the most important events in the history of man. It's certainly equates with the what the Wright brothers did in 1903 and unfortunately so far, it's about at the same stage of development. But we now have within our grasp the capability of inventoring all the natural resources in the world - all of them. And of maintaining the continuous inventory of those natural resources. At the present time my company only in remote sensing use only the USDA aerial photographs to do planemetric mapping and forest type mapping for planting and inventory purposes. And on a limited basis we do some volume estimates of aerial photographs. But problems with the insects and disease and fire and storms require extensive and expensive low altitude flying tied in closely with ground determination - all done with the naked eye. And incipient damage is absolutely impossible to pick up. And what we've got here is as far as I can see - -

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WEBSTER - and incipient damage is absolutely impossible to pick up. And what we've got here as far as I can see, is a system which will permit us all to know what's happening all over the world, with all the world resources at any given time. Based on my very limited knowledge of what's being done here, I can visualize these satellites inventoring and monitoring tree species. Mr. Heath's already showed me that we can do some of it. It will improve. And that particular thing is done entirely with ground checks now. Determining disease locations and we now, as I mentioned have no practical way to determine the location of dormant o: incipient disease infestations. Insects, same thing is true, although occasionally at this time, if we put a man on the ground, my company does this every winter. They put a lot of men on the ground, walking through the woods looking for the southern pine beetle, and that is rather expensive, and is a kind of a hit or miss proposition. Thinking it over before I came out here this morning, it occurred to me that if this system were fully developed right now, we could probably very quickly solve this tussock moth problem that they are experiencing in the northwwst in Washington and in Oregon, where they have forbidden the right to use DDT to control this moth. At the present time, it has killed something like 400,000 acres of timber and some projections are that by this time next year, the moth will have destroyed over a million acres of timber. They apeak of 600 square miles. Now, if the decision is as critical as they say, surely the Earth resources satellite could determine this, could give us enough information so that EPA, politicians, and so forth could come up with the answers immediately, and by - the immediacy of the thing is, that they tell me that if DDT is not put on it by June 1, which is Friday, that it's a dead outfit. Additional catastrophic damage, as you've seen, the fire and windstrom damage. As a matter of fact, our guys are this week flying today - My company's people are flying some hailstorm damage north of Cleveland, Texas, which has not only killed three million feet of timber, based on rough estimates, but all the fish are dying in the creeks up there. We don't know why. And we got all the stops pulled up, trying to figure out whether it's us or the hailstorm, or what. Forest volumes, as in the agriculture area, and certainly the geologic area, certainly we could determine forest volumes worldwide, and conceive of what this could mean strategically. Blows my mind. Forest growth, soil types, and fertility, and we can do that based on the knowledge we have now, I think, with all of it. A very crude manner based on plant communities and so forth, but this will teach where we can grow what the best. Wild life habitats, for those people that are extremely interested in that. Certainly, current soil moisture and current soil moisture conditions anywhere in the world and sustaining conditions, again, where? It will enable us to do continuous mapping and intensive long range planning that we just don't even dream of today. As an example, this ERTS satellite picture of the fire damage. This was taken incidental to its routine overflights, and today, this sort of thing has to be done by intensive ground and aerial checks by experienced personnel. The thing that struck me is this was done from a satellite with only 15 spectral analysis combinations. And the one that's up now, I had a guy figure up this morning for me, has 6462 combinations that they can put together. The possibilities are endless. Thank you.

PAO Any questions for Mr. Webster.

PAO Let's move ahead then, to the subject of agriculture. And George Specht of Martin Marietta

SPECHT Thank you. I might start off by saying that each particular field crop and the condition of the fields, whether they be plowed or what the moisture content is, each different type gives off its distinct signature. Now, NASA has been doing research in determining exactly what these signatures are, and assigning values to these signatures, and comparing these to crop calendars as we might call them. And through this data, we can do two things. We can find the slide for you. One thing is to increase the crop yields, something beneficial to man. May we have that first slide? Some of these things that we can evaluate from multispectral analysis are the physical and chemical properties of the soil. The topography of unimproved land which may be good land to cultivate. We can monitor a runoff in erosion, and kind of keep our planting out of those areas. We can inventory water sources and determine the water content of the soil. We can detect very early, diseases and insect infestation. And we can optomize crop planting practices through analyses of different types of fields, and how they are growing. And we can determine best row spacing, best planting and harvesting times fertilization requirements, and irrigation requirements the best crop rotations, and the best crop species for different areas. And we can also determine the particular crops in different fields and the sizes of the field and in doing this with valid crop surveys and census and yield estimates and a good management of planting and distribution, we can optomize a worldwide agricultural practice. Now, we have

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next slide, I think is - this is some ERTS imagery of an area just east of San Francisco. This is the San Francisco Bay on the left and over in this area is the (garble) region of California, in which we have done some analysis, since we do have ground truth data from there. Each different field type, we can assign a specific color to, and I think the next slide will show you what we can do with processed imagery from digital data. We assign a known - through the known signature we assign a particular color and then we just run the tapes through the computer and we come up with maps like this, which show the particular crop types. And we can also determine the areal extent of the fields. Now, Dr. Richard Phelps is with us today. He is with the Anderson Clayton and company and they have fields in this area in (Garble) and he has done a great amount of work with aerial photography. I think we'll let him get into some of the things that he's been able to determine, from this same area. Dr. Phelps.

PHELPS Thank you, George. First, Gordon, before we get angry letters from agronomists, let me correct you and say I'm not an agronomist. My title is meaningless, but it's Director of Technical Information Services. I have to think about that, because we don't use titles very much in Anderson Clayton. What I would like to do, if it's all right with the chairman, and you people are sitting out there in the hot lights and so on, is go through this paper briefly, and then show you four 9-inch transparencies. If I tried to do it at the same time I talk about the paper, I don't think it'll mean quite as much. So I'll try to give you a brief rundown of what we've done and then illustrate what I'm trying to tell you. As all of you know field crops are subject to a wide variety of disease problems, weather problems, and so on. We've been faced with a serious cotton problem in Arizona. We didn't have much luck in solving the problem in traditional ways, so in 1971 we initiated a small remote sensing program to see if we couldn't solve the problem by some more sophisticated techniques. A lot of previous university, government, and private studies had indicated that this problem, which involved cotton rotted in the lower third of the plant, down near the ground. It showed that this work and - a practical look at the problem showed that you couldn't really visualize the problem, even walking through a field, because the upper two-thirds of the canopy - leaf canopy of the cotton plant shielded the rotten cotton down in the lower third of the plant. So, even though we applied sophisticated techniques, we really never thought we could ever --

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PHELPS - shielded the rotten cotton down in the lower third of the plant. So even though we applied sophisticated techniques, we really never thought we could ever see the problem, so to speak. What we thought we could do would be to see some environmental problems - environmental conditions that were associated with the problem. And then, hopefully, be able to do something about these environmental problems. I'll explain this in a little more detail in a minute. Now our limited familiarity with color infrared photography and the availability of all the NASA data - aircraft data in particular - and the very good coverage of the primary target area, which was in Arizona and California, influenced our choice of color infrared over the other remote-sensing techniques. But we do not mean to downgrade (garble) radar, thermal scanning, or anything else. It's just that it was more convenient for us to use color infrared, and that's why we zeroed in on this particular technique. We looked first at both Arizona and Southern California, but since there was better coverage of central Arizona and we had more ground truth data in central Arizona, we concentrated on that particular area. We did use some Apollo 9 imagery in our study, even though I won't illustrate any. Apollo 9, if you remember, was around March of '69 and the cotton is not yet planted at that time of year. So Apollo 9 was used only to detect citrus plantings, which seemed to be associated with the problem, and for a few other reasons like that. But we did not use Apollo 9 extensively. We spent a great many hours down at the Manned Spacecraft Center - or Johnson Spacecraft Center, here - trying to find some color tone on this infrared film that would match against some of the fields that we knew had this particular boll rot problem. But because cotton fields are not homogeneous, you get a wide variety of tones in the film. We began to think that we were embarked on a hopeless mission. But we were a little pigheaded, so we kept up. Most of the NASA aircraft film, as you know, is taken from so-called high-altitude film. It's 50 to 60,000 feet, roughly. And if you're using an RCA camera with a 6-inch transparency - and correct me, George, if I've calculated this wrong - I beg your pardon, first if you're using a Zeiss with a 12-inch focal length on the camera, which, if you're looking for a small diseased place in the cotton field, why you got to look real hard. And if you're using the RCA camera with a 6-inch focal length - I mean with a - let's see - with a 12-inch in the RCA, 6-inch in the Zeiss, that's right - with the RCA you have 185,000 acres per frame - 50,000 in a Zeiss with a 12-inch focal length, about 185,000 acres with an RCA with a 12-inch focal length. Then, if you go to an ERTS 1 picture like we saw, you're looking at about 6-1/2

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million acres in one of those 9-inch transparencies. When we started, we thought we had to come down to a low elevation to begin with in order to find out what some of these color tones were. So, we talked Herb (garble) of the Geological Surbey Office in Phoenix into making some low-altitude flights for us to get our bearings - to - we had to start from zero, so to speak. So Herb made five flights for us in the summer of '71 at elevations of 2,000 to 6,000 feet. We also had to start with some known problem areas that were real small experimental plots. So we selected the cotton research station at 40th and Broadway in Phoenix. In a minute, I'll show you what I'm talking about. And, we had a history of what the experiments were - the irrigation practices - the fertilization - the weed control, and so on. Then we were in a position to match some of the irrigation tones - the red and pink tones and so on - contributed by the irrigation practices - to - against the cotton problem. Then we had a kind of base to start off from. We also went down to Weslaco, Texas, and to the USDA people there, and they showed us the color infrared tones of cotton that's grown on salty soil. So, we added that basic information to our knowledge, again to have an explanation of what some of these various tones were in a heterogeneous, commercial cotton-growing field. So, armed with this information, we then moved to some larger commercial growers' fields, took a few cotton boll samples in these fields - and keep in mind that not any of us in this room, I don't think - even those from the Harvard College of Agriculture - can go out in these fields and be absolutely sure you have a problem. You have to take 100 to 200 cotton bolls, grind them up, chemically analyze them by what is called thin-layer chromotography, and measure the results of this disease - these toxins put out in parts per billion. Now, for you space people, 1 foot is a part - a billionth of the way to the Moon, or it's 1 second in 32 years, or - for you martini drinker - it's jigger of vermouth in 1000 railroad tank cars of gin. So, we're talking about - you know, what started out to be a difficult problem - these are only in minute concentrations, these effects of the disease. Anyway, we sampled some commercial cotton fields enough to be certain that we had a problem in some of them. Then we selected the most likely one, which was about a 70-acre field, sampled every 40 rows on the north side of the field and on the south side, 100 to 200 bolls per sample, went through all the chemical analysis, matched the data against the film, which I'll show you in a minute, and began to learn that certain environmental conditions - which was very vivid on color infrared photography - was associated with the problem. We found that cotton that has a very crimson color which is grown in a heavily irrigated part of a field has - seems to

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have a high incidence of this problem, under the desert conditions of Arizona. Conversely, if you have a field that's not overly irrigated - and you can detect this on the infrared film because it would have a yellowish-tan color to the cotton under infrared - we found essentially no problem in this type of cotton. So, remote sensing really paid off for us. That encouraged us to try to apply some of the remote-sensing techniques to our commercial farming operations in CAlifornia. And last year we hired a commercial photographer to film about 30,000 acres in Fresno County at altitudes of 12 to 20,000 feet and made a flight in July and another in August and a partial one in September. And I'll show you a couple of those frames in a minute. We have not completed all of our analysis of the data because there are 125 fields, 110 color infrared frames. But what we've learned to date is that certain problems that we could not detect on the ground, or at least were never brought to our attention, were land-leveling problems, where you have uneven - too much of a slope to the field - go in and level it, and when you do, you take off part of the top soil in places and introduce trace mineral deficencies - in particular, manganese deficency. And when you look at color infrared photography over these areas, you'll see a very light-colored cotton crop. We've also found some very mysterious red spots, which so far defy explanation, and we certainly welcome theories. They look like measles on the photograph, and I'll show you they have nothing to do with the development of the film. They could be - well, it could have been an orchard there 20 years ago or something, and it changed the structure of the soil, but, at this time, we can't explain them. (Garble) Child, Bob McDonald, and Brian (garble) and others down here at the center have been particularly helpful to us. And late this past summer, they loaned us an ERTS 1 satellite picture, over the Monterrey Bay - San Joaquin Valley area. This has been a tremendous help to us because it complements our 12- to 20,000-foot film. And their - the satellite picture they loaned us -

END OF TAPE

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PHELPS - This has been a tremendous help to us because it complements our 12 to 20,000 foot film. And the satellite picture they loaned us, which we'll give you a copy of in a minute, was taken the 23rd of July and our filming was the 13th of July. There are only a couple of weeks difference in the tones there and it is really unbelievable what you can see once you know a little about the ground truth data. There is a certain black T in this picture over on the right hand side that I'll pass out when we start showing these frames. This black T that you see about a half inch in from the right border of the frame is burned-over barley stubble in - the horizontal part of the T is a half of section of land, 320 acres or a mile across by a half a mile deep and the horizontal part is another half section. And the black again is - is due to burned over barley stubble. All the way around the black T - every field touching the black T is cotton land, just to orient you. All the yellow you will see in there - almost all of it is barley stubble and the yellowish tan you will see is safflower, not stubble but the crop has not been harvested. And the pink tones you see are sugar beets. We can't differentiate, at least I can't on this one frame, alfalfa from cotton. It's possible to do it but not in one frame. It's still very difficult for us to realize that we can obtain so much detail from an electronically reconstituted print transmitted from a satellite as far away from the Earth as Wichita, Kansas is from Houston. And I might say that not only can you pick up the fields on this Earth sattelite picture from 570 miles high, but you can actually correlate the damaged areas of fields where you have a field of 50, 60, 70 acres and you have a poor cotton crop in one part of the field. If you take a magnifying glass and look at the ERTS imagery with it and hold this low altitude frame against it you can see the correlation between the damaged field and what's visible on the ERTS satellite picture. Now if anybody told me that, I wouldn't believe it if I hadn't of see it with my eye. Now we're anxiously looking forward to the Skylab data and we understand Skylab is about half as high as ERTS, so we expect equally good and maybe even better images from that. And as long as we can get the images or prints from the Sioux Falls facility why we'll put it to work. Now I'd like to show you four frames if I can have them on the viewgraph. This is a frame of the cotton station at 40th and Broadway in Phoenix. The Phoenix airport is right out here. This frame is probably about two to three thousand feet, I don't remember the exact heighth. But the thing I wanted to point out to you is everything in this block is Delta pine 16 cotton, the same variety planted the same day. The different red tones are due to the irrigation

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treatment. And the red blocks, the little red blocks you see are - were irrigated the day this was photographed. The other tones if we had this blown up a little bit or you looked at the frame with a magnifying glass, you'll see there are five different irrigation treatments in there and I've tested secretaries and had them put the plots in one of the five categories and they can do it with 100 percent accuracy. This is a very good illustration of water effect on cotton. There are many other things but in the sake of time let's move on to the next frame please. We need to have this part at the top - this border at the top. This is a high altitude NASA aircraft picture. I believe this is with Zeiss camera. This is just south of the city of Phoenix. This is the - for any of you familiar with it, is the International Harvester proving ground for you right here, south mountain area. But I want you to concentrate on - could we pull that down just a hair? We may be running it off - -. Okay, here we are, okay. I got it. We want to concentrate on this field right here. I'm going to show you a low altitude picture of this field. This particular print here is a transparency about the first of October and the one I'm going to show you is taken earlier in the Summer. This is all cotton in here, but the fellows cut the water off this and has a very weird looking crop. This particular field here is a 70 acre field that we sampled very extensively. It has Delta pine 16 cotton on the west end - west half and Stonebill 213 on the other and if you look closely even from there you might see a different tone from here to there. I point that out because different varieties have different infrared tones. Now, if could have the next one it'll blow it up. We need to have this side on again to the top. This is the field here. This is not part of our problem really, but you'll notice the very peculiar looking cotton down here. This was heavily infested with a boll worm problem, but the fellow went ahead and harvested prematurely so he cut us out of our experiment. And since it was a commercial grower we didn't have control over it. We concentrated on this field here. Our big cotton boll rot problem is down in here and if you look closely you'll see that it has a relatively homogeneous infrared tone to it. A nice crimson red tone to it. You get up in here and you can tell this cotton is stressed for water. There was no problem in here at all. And we have much other data to go with this, but this illustrates how the Infrared did - color infrared did help us solve our problem. Next frame please. This should be at the top again this border. The frame will be attached to the press release ERTS picture. You will find the black T over on the right hand border of the frame. This picture taken two weeks earlier

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doesn't have the complete T black. But only the vertical part has been burned over. Later this stubble was burned. This is barley in here and actually this (garble) which is rye wheat cross in here, but it's very hard to tell the difference. All these are cotton fields around here, but I'll illustrate - around the T are cotton. I'll just briefly illustrate a couple of things. Here is herbicide damage. This herbicide was not supposed to affect that cotton. But it did seriously affect it right in here, presumably because it was applied when the temperature was too hot. All these little spots you see in here are previous herbicide treatments to control morning glory which is a very serious weed in the San Joaquin Valley. And here is an old flood channel that you can pick up. This is a field of safflour here. This is a full section of barley one mile by one mile. Here you see some irrigation water being applied. It makes that dark tone up in there, too. And the light areas you generally see are due to a high salty soil. This is very salty soil as you get over toward the Fresno slew. These are tomatoes in here that are being harvested and the different streaks you see are where it's harvested and not harvested. And the little white dots are actually tomato pickers. If you look at this frame with a magnifying glass you'll see the tomatoes in the wagon. The tomatoes are yellow under color infrared. There are some - the red line right there down through there - I don't know if you can see it from there, but as far as we can tell this is a compaction strip where the - it was a so-called turn row the previous year and the soil has been matted down hard. We would expect it to be light rather than red, but it - for some peculiar reason it's showing as a healthier crop. I think I have one more frame. That's it. Okay. Glad to answer any questions I can.

PHELPS Yes sir?

QUERY You've mentioned some services - the aerial and the ERTS satellite that gave you information that you couldn't get on the ground or you couldn't get it except at great expense and you've also mentioned where you've been able to use the information for some benefit. Could you put a dollar estimate on any of the money you've saved? The difference between doing it one way and doing it the other? Or any dollar estimate on how much good it did any of your crop work?

SPEAKER I really couldn't at this stage because we haven't completed our study and we haven't really put dollars into this thing. But I'm glad you brought up the point - -

END OF TAPE

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PHELPS I really couldn't at this stage because we haven't completed our study, and we haven't really put dollars into this thing. But I'm glad you brought up the point because, one thing I left out of my talk, was one reason we like to have ERTS imagery over aircraft imagery is, it all has the same lighting effect. Every time you change frames on the airplane you get different lighting conditions, and it makes it difficult to compare one cotton field in one frame with a cotton field that's in the next frame of the film. With the ERTS, since it covers so much area, it all has the same lighting effect, or maybe it's corrected to the same lighting effect, but at least to us, it has the same lighting effect. It allows us to not only compare all our cotton fields on the two ranches, which are separated by 65 miles, it allows us to compare with our neighbors to see whether we're doing a poor job or a better job and so on. It allows us to compare the low salt areas against the high salty soil areas. And so it gives us a way of making comparisons of a larger area that we cannot do with aircraft film.

QUERY You gentlemen have done a very fine job of describing in good detail all of the things that can be done, that you are doing with aircraft and with satellites by infra red scanning and other means. The question comes to my mind, if you can already do it, why do you need the Skylab at this time?

SPEAKER I'd like to field that a little bit, if you don't mind. I think that you're trying to make Skylab an applications satellite, and it is not an applications satellite. They're trying different kinds of instruments on that. It is strictly experimental. And I think we pointed out earlier, the instrumentation that's used on the ERTS was originally experimental, and very, very simplistic type of instrumentation. As the aircraft program progressed and they found that they could do more and more things, and as we gained more and more knowledge, you know, more things presented themselves. So, we needed to find out and still need to find out, what actually can you do with these instruments? And to try to make the Skylab an operational system is the wrong thing to do. It's strictly experimental. And we really don't know what's going to fall out of all of this. Certainly if Dr. Phelps can analyse his agriculture with four channels from ERTS, what kind of potential would exist with a 13 channels of multispectral scanners on the Skylab? I don't think anybody could predict how well you can do it. As was pointed out by the gentleman from Kirby Lumber a while ago, you know, they had no idea the things that they

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could do until the actual experiments were complete. And to try to force these satellites into an operational mode is probably the wrong approach. All we're saying here is that the experiments have been so successful that we're trying to increase our experiment and bring the applications and the applications engineering along with the program.

HEATH Let me add just a bit too that. We in the program look at this problem as being in its infancy. We're just beginning to scratch the surface, and we look at it as an information system that eventually will evolve from this, that we'll be able to - not after long hours of study but very quickly be able to run tapes through computers and come out with instantaneous information which can be disseminated to the agricultural agents and then to the farmers. We've got a very, very long road to go before we can ever get to that point. We're just barely starting this process.

SPEAKER Well, I think one interesting thing that Mr. Heath mentioned to me on one of our previous visits here is that, with the very limited data they've gotten from ERTS, it can collect enough infoimation in one second that will require them two years of study to analyze. Now, hopefully, that wouldn't last very long. Within a few short years, we should have the computer system, we should have the basic data collected, that will turn this material out on - well if it were on the Skylab basis - every 18 hours, or whatever.

SPEAKER Eighteen days.

SPEAKER Eighteen days the information comes out, which is fantastic.

SPEAKER Skylab is once every 5 days.

PHELPS I won't pretend to answer the question. I don't have enough information, but one thing that we hope Skylab will do, is give us better resolution. With the ERTS, of course, we're at a 575 mile altitude, and as we drop down, and I understand from talking to George, that we're going to get even better resolution than what you'd expect dropping from 570 to 270 or something, whatever the altitude is. And with cotton production it is very critical to have the water on the cotton to adequately irrigate it when it's fruiting. If you don't put the water on when it's fruiting, you can just forget about it the rest of the time. That is the real critical time, and if we can get to the point where we can, where Skylab can go over and image this cotton, say the 15th of July, and at 5 day intervals, then we can pick up the film in, say two weeks or something like that. A lot of times we'll be able to correct the problem that we can't correct right now, at least, not

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as well.

SPEAKER I might to say a couple of more things in this vein. From Skylab, we're going to be getting actual photographic data with high resolutions up to 180 line pairs per millimeter, which we can't get that kind of resolution from scanner data. And number two, we're working in the areas of interpretation. And in order to develop techniques to reduce the data, we have to be able to take out the atmospheric attenuation of facts on the data. And we have an S191 spectrometer on board, which can track the entire pass, a point target of one quarter mile, which will give us a lot of information on atmospheric attenuation, so we can determine how to remove this.

QUERY In other words, then, what you're saying then, is the EREP pass experiment on Skylab is nothing more than an extension of your ERTS equipment.

SPEAKER Very much so.

QUERY And you're pushing the state of the art in a lot of ways.

SPEAKER Greatly.

QUERY I understood, the sensors on Skylab had both applications of - that is we were trying to improve the state of the art, but that there would be hard data, also, coming back from the EREP package. Things that will go into the center at Sioux City and Sioux Falls where ever, and is this - you're saying that this is just the - that this is really just the beginning?

SPEAKER Most of the data that's coming off Skylab is over selected test sites. And if it is not going to give you worldwide coverage like you get on the ERTS. They're just selected test areas of a firrite area in particular areas. And all of that data will go eventually to Sioux Falls so that it can be used by anybody, but it is just selected test sites. So that you're pressing the state of the art.

QUERY It is correct in saying that there'll be hard data that can be used immediately?

SPEAKER The multispectral package is something that we've been working with for a good many years so this isn't a far out approach. This is something that most people are fairly familiar with.

WOOD We surely thank you for sitting in with us this afternoon. If we can help you in any other way, please come to us.

WOOD Mr. Webster has something more he wants to say.

WOOD Yeah, we have five sets of five different news releases that cover these presentations that you are welcome to take with you. A couple of them have

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colored photography and so forth. So come help yourselves to those.

WOOD Thank you very much. Yes, this is being taped. This has been taped, and it will be typed and transcribed like the other mission data.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 30, 1973
7:15 a.m. CDT

Participants:

Milton Windler, Flight Director
Guy Jackson, Public Affairs Officer

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Time: 07:15 a.m. CDT
5/30/73

PAO Milt Windler the Flight Director is here for our first early morning press conference and as usual we'll let him make the statement and then take questions.

WINDLER Well, it's been a pretty quiet night. The crew slept down in the sleep compartment of the workshop. They reported that they had a fairly nice rest. I think they said that it's cooler than it has been although I think they said some words which ya'll perhaps overheard on the loop but indicated that they wouldn't have minded if it had been a little bit cooler, but they felt like they did get a pretty good nights rest. And we've - the - let's see - I guess it was Kerwin had the 133 sleep monitoring device on and it worked pretty good for a while but then the electrodes apparently got dry there and the data was not completely satisfactory throughout the whole night. And we're still looking at that and trying to understand it because we just got a report from the crew about that when they work up a few minutes ago. And other than that we've been planning what we're going to be doing today. It's a pretty full day as far as experiments go. We have an EREP pass. A lot of ATM work, biomed runs, a little bit of everything I guess. And tomorrow; we polished up plans for tomorrow and that's more of the same. The weather looks real good and we've got another EREP pass tomorrow. We looked at the weather for the day after that - day 152 and that weather doesn't look suitable for that - to try to change the plans to have the crew dayoff on that day. So that's presently the plan. And that's about where we are. Neil Hutchinson is just getting ready to hit the ground running over there with the execute team and get all the things done today that are on the flight plan. Now I'll try to answer questions.

PAO Please wait for the mike.

QUERY Could you go over that EREP thing again. I'm not sure I understood you there. I'm a little foggy this morning myself.

WINDLER We do have a pass today, EREP pass today and the time of that is oh, let's see if I can find it in the flight plan, from 20:34 to 21:01. And I believe that's down through the Texas area starting from over in the California area, winds up across in through the Rio Grande Valley, I believe. Yes on schedule for tomorrow too. We have two flight plans for tomorrow. As we usually do we have an EREP pass and in case the weather is not satisfactory we have a no-EREP alternate. And what that amounts to is essentially doing some corollary activity and an ATM viewing period in place of the earth resources experiment. We have M487 and S019 scheduled for the alternate tomorrow in case the weather is not satisfactory.

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QUERY Then you mentioned the crews dayoff.

WINDLER The day after that.

SPEAKER The day after that, right.

WINDLER They - whatever today is and then the next day and then the next day. Today is Wednesday, is that the day. Friday I guess would be the day off.

QUERY Do all crew members get the same day off or do they stagger them.

WINDLER No, they're all off on the same day.

QUERY Okay, and -

WINDLER Now when I say off, that's essentially - there's a few light things - of course they have to continue with their food preparation and that sort of thing and there is just a little bit of gauge monitoring involved. I think they do have to go into the spacecraft, command module and look at some gauges and there is one experiment up there that they just read a dial on. And that's about all.

QUERY Let me ask one more thing, I'm sorry. Neil said last night that Rusty Schweickart was going to Huntsville today and that some other crewmembers were going with him, corp members - do you know who else was going to go and what kind of a procedure they're going to work on the probe and drogue?

WINDLER I don't know anything about that. I do know that there is some time set up today to get an inspection of the drogue or the probe rather and -

QUERY I'm sorry it was the solar wing - they were going to work out a procedure in the tank.

WINDLER No. I don't know anything about that at all.

QUERY If the day off will be, what, Thursday,

WINDLER No, Friday, I believe it is.

QUERY It will be every Friday from now on?

WINDLER Well, we try to do it every week - every seven days, plus or minus, if the weather was real good why we can move it around some in order to take advantage of good weather for the EREP so it's approximately every week, but it doesn't necessarily have to be that way.

QUERY And have you discovered any more bad food other than the catsup?

WINDLER You've got one on me there. I didn't even know the catsup was bad. They haven't eaten. They're eating now, of course, and I haven't heard them say anything about it. I really don't know. Oh, was it. I'm sorry. The only thing I heard about it was they thought the butterscotch pudding wasn't going to be too good but I haven't heard of them eating any of it so I really don't know. There is no bad catsup, you're telling me. All right. Good.

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QUERY If it's not too early or late in the morning can you record other countries which participate in the EREP pass or are under the EREP pass?

WINDLER I don't think there are any other countries. Is that your question, other countries? No I think all of these in the United States happen to be, although there are some, you know, in the ocean but -

QUERY Central America and Columbia I think I heard something.

WINDLER No. I don't think this pass goes over that area. I'm pretty sure it doesn't because it's -

QUERY Maybe it would be a later one.

QUERY Sudan, Africa and the Phillipines were mentioned earlier over the commentary.

QUERY Yes, there was something I was just reading.

SPEAKER That was mentioned about an hour ago.

QUERY By somebody in the Control Center?

SPEAKER A PAO commentator.

WINDLER Well, I'll have to check on that before I go back but I don't - it is track 20 all right, unless I'm mistaken and how I remember the orientation of that though - I guess it could be going through those areas but it's only a 30 minute data take and I don't think it goes that far but I could be mistaken.

QUERY Where are you now as far as temperatures are concerned in the - well -

WINDLER Around 85.

QUERY They haven't changed much from midnight yesterday?

WINDLER No, I think as I have looked at them I think they went down some last night. Now I understand that nobody is real sure whether that's a night-time effect from everybody being quiet, you know, sort of like when you rest in bed it gets cooler. I guess it's - we still feel like it's gradually going down although the rate of drop is not very large, if that's the right way to say that.

QUERY I may have missed out on this earlier but have you been able to find the cause of those trouble lights in S190. There was some problem, I think it was S190 yesterday. One of the EREP experiments.

WINDLER Well there is a light that indicates that one of their coolers is not working on 192 I believe it is.

QUERY And also they had sone targeting or calibrating problem with it.

WINDLER Yeah, there are several little problems in the EREP equipment and I guess - I'd hate to say exactly

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what's wrong with that right yet. In fact, I don't know as how we'll let the crew run with it again to get a better handle on just what it going on. I know that one of the - I think they suspect that one of the coolers is not cooling one of the instruments down - one of the channels down properly. And there are some other indications like you described.

QUERY As far as the weather is concerned, I'm kind of curious to know what you consider good weather for an EREP pass and how much of this good weather has to be along - how long an area in order for you to consider everything is okay versus not being okay?

WINDLER Well, it's really kind of unusual because there are two kinds of EREP passes or two kinds of investigations, I guess, is the way to say it. There are some investigations that like lots of cloud cover and there are others that like to be able to see the land, which means that essentially you have to have less than 3/10 cloud cover which would be about like scattered or clear. And right now there is a great big high sitting over the United States, the southern part of the United States or southwestern part, I guess, really. And so the conditions are good for the kind of investigations that require the clear skies. And we have a kind of a ground rule that we like to get at least 10 sites covered - usually we wind up with numbers like 20 or 25 or 30 and you'll find that they are clustered in certain places. For example, in the California area there is a large number of them. There is a large number in the Texas area, this general part of Texas, the Gulf Coast or southern valley area. There is a number of them around the east coast around the Chesapeake Bay area. You're familiar with those names, I'm sure or those areas - (garble) area and that sort of thing. So, you know, you can have a relatively small part of the country that is clear, but it gets you a lot of sites sometimes if it's in the right place. Now if you ask me how many is the number today I can't tell you.

QUERY And what about time constraints? You mentioned 30 minutes - is that sort of a standard?

WINDLER That's actually kind of a long one considering our power situation. The longer we stay in the Z-local vertical attitude the greater strain I guess you'd say it is on the power system since it's not, you know, getting the benefits of the Sun or at least directly. And we'd like to have - the ideal I guess is near solar noon which - or local noon - which would, which is going to happen tomorrow, as a matter of fact, I think we're like within 15 degrees on either side of the noon pass that is set up for tomorrow. And that's a little bit better situation. It's a shorter time also, let's see, that's - that one happens to be about - well it's 29 minutes so it's not too much different in time.

QUERY GARBLE for tomorrow, do you think? Or do you know?

WINDLER Well, the weather is good enough that we are going to try to - we are going to put it on the flight plan.

QUERY I see.

QUERY Let me ask you about last night's sleep a little bit. Maybe you overheard the surgeon or somebody, can you give us some idea of Kerwin's depth of sleep and whether he did any dreaming or not, if that's possible.

WINDLER Well, the data as I said didn't come in very good on the little gizmo he wears, the 133. So they really couldn't tell about that I don't believe. And like I say the electrode indicated today that the problem was with electrodes being dry and we have to think of a way of fixing that. And I really don't have any idea whether it's a hard thing to do or not. I left just as he passed us that information. So we really didn't get any of that, you know, that kind of information that you described last night, or just a short amount of it and I don't think they really could say anything much about him dreaming.

QUERY Are you sure that they slept in the workshop? Can that sleep monitor be moved to the MDA and operated from another place?

WINDLER I don't know whether it can or not but they did say they slept in the suit compartment.

QUERY They did sleep in the OWS, though.

WINDLER You're right, last night we weren't sure, I don't think, yeah, but this morning he made a point to tell us that and I guess he realized that they had left us without any clear indication of where they were going to sleep.

PAO We now have two questions that were called from the Cape by Mary (?) but I believe they've both been answered but I'll put them on the record. She asked first what foreign countries will EREP photograph today and second what is the situation on the food. And I believe we've commented on both of those.

WINDLER Yeah, I guess we need to find out for sure about the countries and we'll call back over and find out about that, but I really don't think that there are any.

QUERY What about tomorrow's countries?

WINDLER Yeah.

QUERY Milt have any drugs or any medications been dispensed to any crewmen so far?

WINDER I don't know the answer to that but I'm sure you've been told of whatever they were. Do you know?

SPEAKER I'm not really sure.

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WINDLER There weren't any when I left a couple of days ago but I have to admit that I was off for two days there and I really didn't check that aspect of the flight.

PAO Are there any more questions?

QUERY This change of shift briefing was called rather hurriedly but I appreciate Milt Windler coming over and I think the comments will be valuable on the transcriptions for the late risers. (Laughter)

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 29, 1973
8:01 p.m. CDT

Participants:

John P. Donnelly, NASA Assistant Administrator for Public Affairs
Neil B. Hutchinson, Flight Director
Dr. Royce Hawkins, Flight Surgeon
William Keathly, ATM Experiment Program Manager, MSFC
John Wegener, ATM Flight Controller
Gerald Griffith, EREP Flight Controller
Milt Reim, PAO

Shift Briefing
5-29-73

SL-II PC-7A-1
Time: 22:01 CDT
5/29/73

PAO All right, before we get started here if anyone has any questions on NASA policy concerning private conversations, we have Mr. John Donnelly here, NASA assistant administrator for public affairs, who could answer questions if anybody has any. Anybody have a question.

QUERY Mr. Donnelly, I'd like to know whether or not information that comes down to Mission Control on the B Channel will be transcribed and made available to the press.

DONNELLY Yes, it will be.

QUERY Starting when and will we get any of the back Channel B chatter.

DONNELLY Starting as soon as possible. Yes, you will get all the commentary that has come down so far. Completely and in full.

QUERY Is there going to be a change of shift briefing in the morning.

DONNELLY We're taking a look at that, and try to work something out (garble).

QUERY I don't know if this is relevant to this, but Roy Neal was saying that the crew would be told that there will be no procedure available for deploying the solar panel for at least a week. I wonder if this has been on the B Channel?

DONNELLY Not that I know of, Reg, I haven't seen it. Maybe some of the fellows that have been working on the shifts would be in a better position to answer that than I would. Okay, I don't want to -

HUTCHINSON Okay to ask it again, is it? You want me to answer that one now?

DONNELLY No, I'd just like to say, I don't want to muddy up the waters on your briefing here, but I just thought I'd thought I'd make myself available, if you did have any questions on that.

PAO All right, we'll get started then. I'll introduce the people. Starting on my right here is John Wegener, the ATM. And on his right is William C. Keathley, who is the ATM Experiment Program Manager from Marshall. And Neil Hutchinson, Flight Director. On Neil's right, Gerald Griffith, EREP, and on Griffith's right is Dr. Royce Hawkins, the Deputy Director for Medical Operations at JSC. We'll let Neil Start.

HUTCHINSON Well, I don't know how much you listened to about what went on today. The air-ground probably didn't have a heck of a lot of conversation on it, but gosh, I'll take activation any day to this orbital op stuff. We had -

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I guess I could describe it as a successful, but hectic day today. I think the crew day was probably not anywhere near as hectic as ours was on the ground. We just had an awful tough time moving into what I would call a normal operational cycle, from what could be called a pretty canned operational cycle. I guess we kind of expected to have a tough time getting started in orbital operations, mainly because it's really a change of pace from the kind of stuff that we've been doing up to date in Skylab. And it's a bit different than anything we've ever done before. Today, as you know, we really turned everything on and we ran - we successfully accomplished the flight plan we set out to accomplish today, with a couple of minor glitches, probably which were of our own making, I'm not sure. I'll talk about some of the equipment problems we had. I'm not sure yet how many of them were procedural problems, and how many of them were really something wrong with the hardware. In summary today, we ran, I believe, four manned ATM passes. We completed the manned ATM checkout first thing this morning. We got two biomedical runs in today. So, we now have had a major bio run on all three crewmen.

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HUTCHINSON - morning. We got two biomedical runs in today, so we now have had a major bio run on all three crewmen. We checked out the EREP gear in preparation for an EREP pass tomorrow and we did have some problems with the checkout and I'll talk about those. And I brought along an ATM officer, John Wegener, here on my left and I brought along an EREP fellow, Jerry - Gerald Griffith, who is the EREP Officer on the silver team. And they'll probably help you if you have any specific questions about those instruments and what went on with them today. I think we're probably moving in to the operations phase fairly coherently. One thing I'd like to comment on in the systems area, which I'm sure you may or may not have heard about, is the temperature situation. This afternoon, after some deliberations during the day, we kind of made a summary up for Pete which we read up over the loop here just before I left and I'll kind of summarize that or paraphrase it for you. Basically we think that we've been of course watching the temperatures and we, as you've been told before, have a computer program at Huntsville which is a fairly expensive model of the cluster thermally. You also know that we've never had the OWS in a tank or anything like that, in a vacuum chanber so, the thermal modeling science is an analytical one as opposed to one that has a lot of test day in it. What I'm leading up to is the fact that it appears that the cluster is not going to get as cool as we thought it was going to get. And it's not clear yet that we know exactly where it's going to end up stabilizing but we're fairly certain now it's probably going to be warmer than we thought. And it looks like it's probably going to be somewhere around 80 degrees. Now, of course we have been watching this thing come down and it started down after we got the parasol out for the first day or day and a half, like it was pretty much following the way the computer said it was supposed to perform and here in the last day or so it's started to peel off and it looks like it's going to level out 8 degrees or so, may-be 10 - at the outside - higher than we predicted. Now, it's not clear yet what effect that's going to have on our overall operation. It's certainly not uncomfortable for the crew, but it's not down as low as we would like it. And I'll say again we're still not positive where it's going to end up stabilizing out. Now, we've done some things today to help the cooling situation down in the OWS. We - to save power we had only been running two of the big air ducts down there and we turned the third one on this afternoon. We also turned on - we put a - as you probably know we have some portable fans in the vehicle. We have installed a portable fan in the hatch between the OWS and the airlock module, blowing air up into the airlock module. In other words, it's taking hot air out of the dome area of the forward compartment and blowing it up into the airlock module where it gets into a heat exchanger, gets cooled and gets sent back down again. And I think that's probably of course the big fans turning on the third duct increases the air circulation down there by a third. That's another 500 cubic feet per minute flow down there. I'm not sure and Dr. Hawkins may want to comment on this. I'm not sure if we ran the full protocols on M-171 today or not.

HAWKINS We did run the full. Both LB and PN 171.

HUTCHINSON So, it looks like we're going to be able to do that. Of course the temperature right now is still up around - oh it's 85 or 86 probably ambient air temperature in there right in that area - it may be 87. So, we're still cooling off and it's slower and we don't think it's going as far and it's going to take a while for us to reassess exactly what that's going to mean to us. As far as the experiments today - experiment anomalies, we had an anomaly in the pointing system that points the ATM canister at the Sun. And I'm not - this is the one that I'm not really sure is an anomaly or not. I'm not sure that we didn't - not drive the automobile exactly right the first time around and maybe what we think is an anomaly really is going to turn out not to be one. I think it's too early to say. Basically, the thing that appears to be wrong - and I'll say again I'm not sure that there's anything wrong - is there is a Sun sensor - as you know the ATM canister has it's own pointing system that stabilizes it even tighter than the stabilization the vehicle has and it works on a principle very, very similar to the vehicle. It has a Sun sensor that looks at the Sun that can tell how far it is off the center of the Sun and it has a set of gyros that measure the slight motions that it has and it's a completely a two degree of freedom inertial stabilization system. The Sun sensors are also used to point the canister at features on the Sun. And we have the capibility to manipulate it - the crew and the ground has the capibility to manipulate it - to drive it down to specific features we want to look at. And you do this by moving a little prism that comes in and directs the light into the Sun sensor and it fakes the Sun sensor out. It makes it think that it's not really on the center of the Sun and so it moves the canister to get it on the center of the Sun. It just - prism just bends the light. Like I said it - we move it in two axes and we call it UP, DOWN, LEFT RIGHT. It's just this way or this way which can move it across the face of the Sun. And the thing that we don't understand and it appears not to be working right is one of these wedge-drives in the up-down direction. And right now it looks like the canister's moving but all the indications we - -

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HUTCHINSON - in the up-down direction. And right now it looks like the canister is moving, but all the indications we have - the canister is physically moving because the crewmen can look in his monitor and see the Sun moving when he moves his little joy stick. However, the computer won't move the canister with the primary Fine Sun sensor selected and the up-down position, nor do any of the readouts on the ground or in the ATM panel change when the canisters move. I don't think we've heard the last of that one - we have two fine Sun sensors, two complete units. We have selected a secondary and are continuing normal ATM operation with the secondary one. And I'm not sure that we understand - in fact, I know we don't understand everything about the primary one. That was our biggy today in as far as the ATM goes - as far as the support equipment. When it malfunctioned it cost us a pass. We lost one daylight pass today before we got ourselves sorted out. However, we did get on the secondary and get - we did a small amount of trouble shooting on the primary and the crew was able to continue on with ATM operations, as was the ground. We run the ATM unmanned when the crew is not there. As far as ATM itself goes, these gentlemen, Mr. Keathley and John Wegener can tell you about the little things we got going with the instruments. We have a couple of instruments that we haven't started using yet, and I'll let them address that. EREP - We ran the EREP checkout today and it was right towards the end of the day, end of our shift over there. And as you know, we have five instruments - five basic instruments - really six, one is the Earth terrain camera which we didn't work on today, but we have five instruments which we were interested in checking out today. We had some little funnies with four of them. In my opinion, and this is awful preliminary of all the funnies that we had, and we had we had some non-normal indications on S-190, 191, 192, and 193. I think the 190 and 193, the 190 being the cameras, and the 193 is the - IS the 193 the RAD/SCAT? The - the altimeter radiometer - I think both of those are probably going to prove to be - there's nothing wrong with the instruments and they'll function normally. On 191 and 192 - 192 is our 13-band scanner and again I'll let the EREP folks talk a little more about this, but basically we had one of those bands which doesn't look like it's working right and the crew was unable to do what we call, align it. On 191, which is the infrared instrument, we effectively really didn't get it checked out because we didn't get a ready light on it due to the fact that the cool-down didn't work properly on the sensing instrument. And I'm not quite sure how we're going to play that one tomorrow. It's probably too early to tell. However, none of the stuff that I saw here today, I think will preclude the EREP pass tomorrow. Do you? I suspect we'll run anyway. We may not run a full-up pass. I think - oh one thing we did today that was completely successful that's of interest - we ran an alignment check today between the ATM and the MDA for purposes of determining where the EREP instruments are relative to the ATM, because of course the ATM inertial alignment is the thing that we use for an inertial reference. And in order to point the EREP we need to know where we are - where the EREP instruments are relative to the ATM. We ran this alignment check by going into the command module and powering up the computer and the optics and taking some star sightings and figuring out exactly where the EREP was relative to the - where the ATM was relative to the MDA alignment. And it turns out that we deployed the ATM within a tenth of a degree. It looks like - of exactly nominal which is kind of fantastic when you think of pulling that great big thing up from the nose all the way up to the top and not missing the alignment with any more inaccuracy than that. I've got a lot of other little ditties here that - boy we had a heck of a day - there was just a lot of little stuff. I think - that kind of sums it up. I think first day of operations - as a summary - I think we just really had a good day. The crew got through the whole day - they're going to get to bed on time and we got an awful lot accomplished, I think. We just have a tremendous amount to learn - on how to smooth out the operation - to be able to turn the crank and get things done in an orderly fashion. But we're on our way.

KEATHLEY I'd thought I'd just add that - the fact that in conversations with the principle investigators on the ATM, I think that the feeling is that they're quite enthusiastic about the first day's activity. Quite enthusiastic about both the data they are seeing - the photo-electric data they're seeing and TV data they're seeing and the obvious successful performance of the instruments themselves. And I think the word enthusiastic can be properly used here.

PAO Dr. Hawkins did you want to make a little statement?

HAWKINS I think the runs today with the commander and the pilot on both the LBNP and the bicycle ergometer did show some improvement over yesterday's run with the - well the SPT today. We ran the pilot the first day, I'm sorry. But I believe there's - this indicates to me anyway that there is a bit of a learning process going on here in how to use that equipment in weightlessness. The first day, Paul Weitz did experience some difficulty with - especially with the bicycle ergometer. And as they described it - there's a mechanical problem - -

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HAWKINS - could be. Paul Weitz did experience some difficulty, especially with the bicycle ergometer. And as they described it, there's a mechanical problem there in learning how you ride that thing. It's certainly different than it is in one g. But, today I think that that looked much better, and I don't have any doubts but what they'll work out the correct solution as to how to ride it.

PAO Okay, we'll take questions now. Wait for the mike. Start right here. John Wilke.

QUERY Where is the crew sleeping? Andfor Dr. Hawkins, was there anything in the private conversation of a medical nature, that you'd like to tell us? Particularly since we got from the summary, if you can believe that, they were having troubles with the ergometer, and you got the impression that maybe they weren't going to be able to do that, or at least not as long as the temperatures were as high as they are.

HAWKINS So far as I know, with regards to where they're sleeping, I don't think we had a positive statement from them as to where they slept last night. My impression was that they would sleep again in the MDA or the command module. There was a statement in the release that you saw, no doubt, from the private conference this morning, that I believe Pete Conrad said that he was warm, which would indicate that they were in the OWS sleeping. Now, I honestly -

QUERY I thought you were going to ask them.

HAWKINS I haven't been back over there to ask them. And no, the word has not really gone up to ask them. I hope that tonight we'll have a definite understanding of exactly where they will be.

SPEAKER Could I point out one thing, Doc, in case of a misunderstanding. Dr. Hawkins was not present during the private conversation.

HAWKINS Yes, thank you, Jack. I thought about that, and then I forgot to clarify the point. I was not in that private conversation. What I'm reading -

QUERY Did you try to get briefed on what went on?

HAWKINS Not in detail, no. I've read exactly what you've read in the summary conversation.

QUERY That's all?

HAWKINS That's all.

HUTCHINSON To answer your question about asking them. Today was absolutely so busy, it never occurred to me to ask them on the execute shift today.

QUERY You were on the private conversation, weren't you?

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HUTCHINSON Yes, I was.

QUERY Well, you can then answer my question.

HUTCHINSON What was your question, specifically?

QUERY About the - Did anything of a medical nature, because the summary said that they were having trouble with the ergometer, and because of the heat. And we got the impression that they could not use this bicycle machine as long as the heats were the way they are. Now, you tell us they had a full run today.

HUTCHINSON That's right, they did. No, I don't think anybody ever said anything about them not using the machine. Now, yesterday, they came down prior to the medical run, and suggested a change in the protocol and they did change it yesterday. And I think, you know, this I mean, riding a bike in 85 or 90 degree temperatures that we're experiencing down there is hard work. And I was kind of surprised they completed the protocols today. There was no conversation about the ergometer in the private conversation. None whatsoever about riding the bicycle or about the temperatures being too hot.

QUERY It was in the summary that that was in the private conversation.

HUTCHINSON I've got the summary right here in front of me, and I don't see anything in it about the ergometer. Oh, it says, with the possible exception of - Let's see I'll read it. See what it says. Well, I suspect that since they did shorten the protocol yesterday and this conversation was held prior to the ergometer today, that Pete was probably just saying, "Hey, look, you know, we rode the bicycle yesterday, and we didn't quite finish it, and today we're gonna try it again, and see how it goes." And like Dr. Hawkins said, they rode it today, and they both rode the full ride. And I imagine they sweat a lot. I imagine it's darn hard work, when it's that warm.

HAWKINS They have had concern about whether they were really going to be able to push themselves to the top level on the bicyclergometer. Initially the first - yesterday, I think the concern was around the LBNP. I don't think that Dr. Kerwin found, after they once got started with the - with Paul Weitz, that really posed as much of a problem as he anticipated and initially thought. And really they found that they were having more trouble riding the bicycle ergometer, and because of the mechanical problem of riding it, they were therefore using more of the arms to - in work - actually to hang on to that thing and ride it than they were the lower extremities. And they felt that under the heat loads that they were experiencing

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that this could certainly limit the levels at which they could obtain. However, Paul went the full three levels. And without any difficulty. Now, today, they went the full protocol, although Pete, I think, again did express some concern about the heat, and if it remained at that level, they still expressing some possible doubt as to whether they'll always be able to really go the maximum.

HUTCHINSON Let me say one more thing about the bicycle. I think the bicycle is kind of like a lot of the other things that we're doing here. I don't think we understand yet, how far we're going to be able to go with it. I think this thing that Dr. Hawkins has pointed out about being strapped on the seat, the shoulder harness arrangement hasn't worked out very well. I think they're learning how to use that. I think we aren't sure yet, where the temps are going to end up, and I think we're just going to have to play it by ear and see now. Maybe by tomorrow, they're going to decide they don't want to ride it, tomorrow, but I don't think that's any big deal. It's like a guy being in the heat, and not wanting to work now. I think the doctors --

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HUTCHINSON - they're going to decide they don't want to ride it tomorrow. But I don't think that's any big deal, it's like a guy being in the heat and not wanting to work. Now, I think the doctors are probably looking at the fact at what it's doing to their medical data. I don't know if riding that thing in 85 degree heat is cutting your medical data down - maybe it is a little bit. It's probably certainly not as desirable as riding it in 70 degrees. And we may have to make a decision we don't want to use the darned thing anymore, but it's just not that big a deal.

QUERY Two questions, one's simple. Why aren't the temperatures coming down as fast as you expected? The other one is do you have any explanation at all of why Conrad asked for this private conversation? Since if you read that summary, there's no explanation at all in there.

HUTCHINSON Well, let me answer the first one. Why I can't tell you why he asked for the private conversation either, but let me try and answer the first one. The temperature thing I think - it's plain and simple that we're on a learning curve with this temperature business and I think that we just plain and simple - the tools that we have available to us to analyze thermal situations aren't anywhere near as - they're sophisticated but they aren't anywhere near as accurate. It's kind of almost like a black magic science. And if there's anything thermal predictions take it's empirical data and we're getting the empirical data now. For example the performance of the cluster over the last couple of days with the shade up. And empirical data pumped back into computer programs leads to new predictions and that's how come we're refining our numbers. I think we're just - we just missed the number to begin with and we're homing in on it.

QUERY It had nothing to do with the shade not working on that attempt to (garble)

HUTCHINSON Well, I think that very well - no I - that's not right - I think that's got to contribute something to it - I mean there's some small percentage and it's not clear how much. And the number 10 percent has been kicked around and I don't have any first hand knowledge of how much it really is, but that's got to contribute something to it because that's letting more heat into the vehicle. And I also think that we kind of miscalculated the amount of reradiation that we were going to get out of the big structures inside and especially things like the water tanks, which of course as you probably heard, Pete continues to comment they are still hot - I mean you can walk - float up next to one of them and you can feel it radiating.

QUERY What about the second one?

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HUTCHINSON Now, the second question was why did Pete ask for the private conversation. I don't know why he asked for the private conversation. I - -

QUERY Did you even get a clue, even though you listened to the whole private conversation?

HUTCHINSON Yeah, I listened to the whole private conversation - no I didn't have any clue - I guess I don't make such a big deal out of private conversations, but I - I don't know why he asked.

QUERY Have you got to the stage where now you know that the temperatures have leveled off so high you've got to consider doing an early EVA and deploy the twin pole?

HUTCHINSON No, I don't think we're at that stage yet. Because I don't think we yet know where they're going to level off. I gave you a new number tonight, and if it does indeed level off at 80 I'm not sure whether we would - whether we would make considerations for an EVA or not - an early EVA. That option of course is open - any time. And it's certainly open at the end of Skylab 2.

QUERY I hate to beat this private conversation to death, but a few minutes ago you said the ergometer wasn't mentioned in the private conversation - -

HUTCHINSON That was a mistake - I have the copy right here and it was and I don't - I didn't remember it specifically being mentioned.

QUERY Well, I just wonder if there are some things that weren't mentioned there that might be worth mentioning.

HUTCHINSON Nothing that I can think of.

QUERY Dr. Hawkins, yesterday I believe it was reported that the circumference of Weitz's calf had decreased by about half an inch. And if I also remember correctly, some more information was going to be dumped down so that it could be analyzed. I wonder, has the information been linked to you and what are the results - do you have any results on the measurements for the other two crewmen?

HAWKINS No, I don't have the measurements on the other two crewmen. I - when I left over there a little earlier this afternoon we had not yet received all of the dump data on that from Conrad. And certainly we haven't yet received the afternoon run on Joe Kerwin. The data that you mentioned was from yesterday, with Paul Weitz, in which they found the circumference of the leg was about a half an inch less than it was preflight - the last measurements preflight. And the other interesting point there was the - that during the exercise experiment run - that the increase in size was not two times the expected - that compared with the preflight. Now we don't yet really have a complete answer on this. Obviously it's a -

relates to a fluid change within the zero gravity conditions.

QUERY I've got several. I'll start with you Dr. Hawkins. First of all, what is the significance if the bicycle becomes where they are not able to keep running it at high levels - or even if they do and in the higher temperature, what does this do to your baseline data? Doesn't this kind of destroy everything you've got up to this point and you have to reconfigure and when they get back I understand they would continue riding the bicycle. Are you going to make them do it at higher temperatures when they come back? Exactly what's the significance of it and - because this is one of your more critical medical experiments as I understand it.

HAWKINS It's really true. And the ideal way of course is that you always run your experiments in the same conditions under which you obtained your baseline data and your recovery data. Well, obviously, we have some deltas cranked into this for us and you have to interpret your data in light of that new change. Now this doesn't say that the data's going to be in - -

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HAWKINS - you have to interpret your data in light of that - that new change. Now this doesn't say that the data is going to be invalid, certainly it's going to be quite valuable, we are going to be able to make intelligent decisions. I think from what we see, it does mean you have to crank in this new variable into your analysis of it. And you have to be careful how you do that. But - and it even means that if you have to continue under higher thermal loads than what we'd like to have, it's possible we may even have to reduce - alter the profile and thus reduce the workloads - top work-loads under which the crew conducts the experiment. Those things are possible, but it isn't going to invalidate what we get.

QUERY And Neil, first of all are you saying on the ATM with the primary Sun sensor we cannot go on unmanned run, is that what you're saying - with that primary?

HUTCHINSON No, it's not. Well -

QUERY You said the computer could not get it to activate correctly, is that the way I understood it, and that would mean you couldn't go -

HUTCHINSON What it would mean is, if it turns out that that indeed is the failure mode, which I don't think we can assume yet, but if it turns out, you are exactly correct. What we couldn't do from the ground is we couldn't offset point the canister from the ground, because we have to go through the computer - he has a little joy stick. However, that would not - that would inhibit some unmanned or unattended operations. John, you might comment on that. What kind of unattended do we do with the -

WEGENER I know it's certainly (garble) a great deal of data that's taken offset pointing, I guess the point I'm not clear on what we're saying is that you're talking about the loss of the two systems, isn't that correct.

HUTCHINSON Of the primary system, now of course, you know we have a secondary system which we have to have another failure to get into the posture you described and the one failure we've had has to prove out to be what I'm second guessing.

QUERY The other thing is - dealing with the ATM exactly what have we been able to learn so far? What have we been doing specifically, and you say the PIs are happy so far with the information, I mean is it what they were expecting to come back with or what?

SPEAKER Well, as far as the data is concerned, the levels - the flux levels are as fairly well expected. As far as the ATM observations are concerned, I guess they could best be described as sort of a balanced diet, so far.

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They're easing into it. We've tracked three active regions today. One of the active regions is a very old active region, it's been around - this is its fourth time around the sun. The other active region is about on its second cycle around the Sun. And the third active region is a very young active region. So, we've done that kind of thing. There's a prominence, a fairly quiescent prominence, that they've been taking some data on. And in addition to that we've done the normal routine synoptic work, so far.

QUERY One last one for now, Mr. Griffith, what is the - which of the EREP sensors is going to be used tomorrow? And will all of them be used during that pass - what is it pass 20 or whatever. Track 20?

GRIFFITH All of the instruments except the ETC will be used tomorrow.

QUERY Two questions, first for Dr. Hawkins. Leaving aside the bicycle, which they may have to go easy on, is he happy about them continuing the other program of work for 28 days in these sort of temperatures? And secondly for Neil, you have spoken about the option you have to deploy - for an EVA - to deploy the thermal shield, what about the effect of the extra cooling devices you turned on inside the workshop on the electrical budget. And would the early deployment of that other solar panel help you in this regard?

GRIFFITH Well, I may need Neil to help answer some of that question. I'm not sure I completely understand all of it, but yeah, the solar - any increase in power is definitely going to benefit all of the experiments and operational needs.

QUERY The question was, it was for Neil - that part of it was for Neil - what is the effect on your power supply of the extra fans and cooling devices onboard. And would it be a help - would you be happier if you had more solar power as you would have if you could deploy that other panel?

HUTCHINSON Certainly, we'd be happy if we had more solar power and certainly it does affect our power budget. We probably turned on today - I'll probably give you a bummer for a number - several hundred watts of additional power for cooling in terms of fans. Maybe, and that number probably isn't overwhelmingly correct. It's over a hundred, I'm sure of that. The effect on our power budget is that we saw today for the first time today the vehicle turned on and experiments turned on and food being heated and et cetera. And it appears that as usual we were a little conservative when we started

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out calculating the numbers and the power - we wouldn't have turned anything on that we couldn't support and we can, with the power we've got right now, support the kind of experiment operations that we conducted today and keep the fans on with the power that we have forever if we choose. The fans and the heat exchangers that we have on now. It obviously cut down on our room to wiggle a bit. Everything you turn on does. And, however, we were able to support it adequately. To answer your question on extra power, as you know, there still is consideration being given to what we may or may not be able to do with that extra - that panel that's not deployed. And all the guys that worry about power have their fingers crossed that sooner or later we're going to be able to do something with it.

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HUTCHINSON - and all the guys to worry about power have their fingers crossed that sooner or later we're going be able to do something with it.

QUERY Two questions for Dr. Hawkins. What was eaten today and did the crewmen comment on whether they liked the food?

HAWKINS I haven't got a report on that. The first comments that we'll really have are in the crew status report this evening in which they will identify those items which they did not eat.

QUERY And (excuse me) a question for Neil. What's he playing that music on? Is it a portable cassette recorder or what?

HUTCHINSON Well, the Sky - no it's not - well it's effectively that's about what it is. Skylab has in the wardroom a - I believe we call it an entertainment center. I know that certainly is a misnomer, but it has in it a tape recorder and some books and some things - reading materials and so on and so forth and it is a cassette player. And loaded on board are tapes of the selection of each of the individual crewmen who are going to fly and you've figured out by now that Pete's a country and western fan. And the thing is just a cassette recorder with a couple of speakers in the wardroom. And it's built right into the wall.

QUERY How do the other two guys feel about country music?

HUTCHINSON I don't know. I hope they like it.

QUERY Two questions, first one, Neil. How close did you come to your power budget today when you were operating maximum equipments, experiments, and everything else?

HUTCHINSON Well, we're running right up near where we said was our maximum capability. We were running between 4100 and 43 or 4400 watts and of course you know we were planning on 4500 watts as a guideline to not exceed, so we're just about right there. And we ran pretty consistently there all day, Pete. Just right there. I don't think we'll run that high at night.

QUERY Is 4500 watts a redline figure and you've got some pad behind that?

HUTCHINSON It's not a - not even a redline. It's a guideline and yes there is a little bit of pad behind that, not much though, but there is probably a couple of hundred watts behind that. And remember that we're talking about average power now. We were sustaining the power level of that orbit in and orbit out. There were peaks up considerably high than that and sometimes considerably lower than that. And I'll probably - I don't remember what the highest I saw today, but up in the 48, 4900 watt range.

QUERY I've got a question for Dr. Hawkins. Do you have any indication that with this heat and the exercise and everything they're are doing that perhaps they're drinking more fluids than they would normally? And how would this possibly affect some of your data?

HAWKINS Well, I think yes, they probably are consuming a little bit more of - which is naturally what they should be doing with - because they are sweating under those temperature conditions. I haven't had any real positive statements about you know just how much sweating they're doing but you can be assured they are doing some sweating over and above what they would be in the nominal comfort temperature range. So they've got to consume more fluids. As long as they maintain a good fluid balance it's not going to affect our experimental results. If they get a fluid depletion then yes, it is impacted.

QUERY I've got a little triple header here. One thing that interests me in the flight plan that I saw for tomorrow was a fire drill. I wonder how they're are going to do a fire drill in space. When is their first day off going to be and could you give us a basic rundown on the flight plan for tomorrow?

HUTCHINSON I didn't bring a flight plan with me and our only job on the - well we did look at it briefly - we really - the execute shift that's on during the day doesn't have a lot to do with the flight plan that's going to get flown tomorrow.

QUERY You did it very well yesterday fr today.

HUTCHINSON Yeah, I know. That's because today was the first one and I was really concerned about everything that was going on there and I have to fly the one tomorrow and would you believe that I've just kind of glanced - I did see the fire drill there in the end. Basically the fire drill is an exercise to - given a fire alarm, to determine where it is, inspect it, go through a series of hatch closures - depending on where it is and what it is and effectively safe - put yourself in a safe condition to either put it out or get out, one or the other. It literally is - the buzzer rings and all the kids go to the doors and march out after due consideration of what it is. And it's - I don't mean to take it lightly, it's serious business. I mean, we got a fire alarm system that's - looks in every crack and cranny around the vehicle and when it goes off, the crew pays attention to it.

QUERY Their first day off?

HUTCHINSON It's seven days so it'll be - well we lifted off on Friday - it's Friday. Why don't we get him an answer on that? Frankly, I'm not sure. I think it's Friday.

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QUERY I know they have been behind but they're catching up.

QUERY Yeah. They still have some - - Pete's talking about debris that's still on the wardroom and they'd like to clean it up. They have some chores and I figured perhaps they might have - lose their first day off or part of it or have it set up.

HUTCHINSON No, I don't think so. The kind of things that he's talking about - he still is not - they still have not got some of the launch restraints and things like that disposed of. They've still got little things that are bothering them like one of the vent ports, I know, and up in the dome area needs a vacuum cleaner taken to it and there are things like that. But I don't think there's anything - in fact, I know there's nothing of a magnitude that would take anywhere near a crew day off for anybody. And as you know everyday in the flight plan - you've been looking at them - we schedule a thing called housekeeping which is - -

END OF TAPE

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HUTCHINSON - for anybody. And as you know, every day in the Flight Plan if you've been looking at them, we schedule house - a thing called housekeeping, which is sort of just about what it says. Sometimes there's something put in those slots, if we have something to do. Sometimes there isn't and if the time is open they're free to do any thing they feel like they think needs doing in the way of tidying up or listening to country and western music - if that's what they want to do. The housekeeping - and we generally try to keep an hour of housekeeping time absolutely free going into every day, that we'll ask them to do things in, as the day goes on - and scheduled time in the Flight Plan. So I don't think, by the time we get to the day off, I fully expect the workshop to be completely squared away and I reckon they'll take a day off. If you can do such a thing there. They'll probably want to look at the Sun or something.

PAO We'll take one more question.

QUERY During the fire drill, and I noticed it also said practice rapid depressurization, will they actually do any pressurization or will they fake it?

HUTCHINSON No, you fake the sensor into thinking it's seeing a rapid decrease in cluster pressure. It's a test device, it doesn't even really test the sensor. It puts a signal into the electronics that sets off all the buzzers and bells and drives the meters and so on.

QUERY Do they know when it's coming?

HUTCHINSON Yes.

QUERY To Neil, have they in fact been told that there won't be a solar panel deploy procedure available for at least a week?

HUTCHINSON Well, the conversation on that went something like - we talked about it and they know that we're working on something and they're thinking about it, and the term a week may have come up. I don't think a week is a - I don't think that's - I think that's almost a figure of speech, because as you know, we've got a thing going in the tank up at Huntsville, and in fact, Rusty Schweickart, the backup Commander, I believe, and a couple of other people are headed up there tomorrow afternoon to start to work on that thing. And you know, in a day or so they may come up with something and it may take them a week. They may not come up with any. I just don't think we know - that's probably a good round number for some concrete plans of something we may or may not do. And I think that the impetus there was to tell Pete that we're thinking about it, we want him to think about it, and we don't think we're going to come up tomorrow morning and say, hey, guess what, we found out a way to get that panel out.

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QUERY Do you know who is going to be going to Huntsville with Rusty?

HUTCHINSON No, I don't. I do know that he's going though, because I talked to him about it.

PAO Okay, thank you gentlemen.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 28, 1973
6:47 p.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
Royce Hawkins, Flight Surgeon

Shift Briefing
5-28-73

SL-II PC-6A/1
Time: 18:47 p.m. CDT
5/28/73

PAO Okay. Change-of-shift press conference. On my right, Dr. Royce Hawkins, and on his right, Neil B. Hutchinson who is the off-going Flight Director. And I guess what we need to do is start with Neil.

HUTCHINSON Okay. We had another day of success today. I think we've got probably about an hour's worth of work left to do over there this afternoon, but I think we can say that we're activated. Basically today was a day of getting all of the boxes out of the way, getting the last of the stowage transfers taken care of, getting all the biomedical gear calibrated and turned on and starting our basic experiment cycle. We got through the day pretty much as we had it flight-planned. The only anomaly that I know of that we uncovered today was with a device called the SMMD, that's an acronym for a specimen mass measuring device. It's a scale that we use to weigh waste matter and food residue and so on and so forth for purposes of accurate determination of body intake and output. We turned on, we have two of these devices, we have one in the waste measurement compartment, one in the ward room, and we turned them on last night - we activated them last night. It turns out that apparently the one in the ward waste measurement compartment got left on all night and we burned the electronics up. And we think it's gone. There's nothing we can do about it, we don't have any spares onboard. We do have the one in the wardroom and we will use the one in the wardroom for measuring both the waste matter and the food residues. And we gave the crew the option that if they didn't want to carry the fecal matter into the pantry there, to weigh it - they could swap the electronics boxes out. They are interchangeable - they are exactly the same - and move the wardroom scale electronics and hook it into the scale in the waste management compartment. Now that's the only anomaly we turned up all day today. Temperatures continue to come down. I think we're probably in the lower 80's in the cabin now, in the air. I'd say probably 82 or 83. We've about got - we've got the spaceship turned on and we're ready to settle down to a standard experiment routine. This afternoon we did run our first big experiment which was a medical run. It's still in progress - was still in progress when I left. Dr. Hawkins will probably want to comment a little more on this but we were not experiencing any anomalies at the time I left. And that includes all the turn-on and activation of the big metabolic analyzer which is a rather delicate device which requires a lot of very precise calibration. Turning the MO-92 which is a lower body negative pressure, all the VSG hookups and everything and that's all finished with no anomalies reported. We finished about 1 o'clock today, the

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unmanned checkout of the ATM, and again it never ceases to amaze me, we didn't turn up a single anomaly. The ATM's all ready for the crew and they're going to start working on it tomorrow morning. I think that's about it. We had an outstanding day and you never could have proved it by me that we'd be where we are today a week ago.

PAO Dr. Hawkins, do you want to say something before we go to the Q&A?

HAWKINS Well, actually I think Neil has pretty well summarized the medical experiment hardware.

END OF TAPE

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HAWKINS Neil has pretty well summarized the medical experiment hardware. I might just touch on a few of the others. I think we are fairly well satisfied at this point that the M092, the lower body negative pressure, and the M171, the bicycle ergometer, have been run and completed success. They just handed me a note here which says that they did complete the M171 at the level 3. So it sounds like that all that equipment is working very well, and the experiment is going well. Before we - before I left over there, we had seen some of the VCG, the vectorcardiogram in the initial checkout. So I'm satified with the data that we are seeing from there. The - we have one other bit of a problem we've got to resolve, which Neil did not mention, with the body mass measuring device., in that some of these weights, which are calibrated weights aboard the spacecraft which are used to calibrate the unit. They are having trouble getting these things to remain in place. The established procedure is to use the shoulder straps which go across the man when he is on there for measuring body weight. And they are having some problem with anchoring these batteries down, which are one of the items used in getting.

HUTCHINSON We gather up all kinds of gear from all over the vehicle and stuff it in the seat of the body mass measurement device to try and get enough weight to weigh the equivalent of a man. And we do it in steps. We start out with just a little bit, then a little more, and a little more until we get up to like 180 pounds worth of stuff. And the stuff that we're strapping on there, we know how much it weighs very accurately. And therefore, when a man gets on there, and he gets readings comparable to the stuff we know how much weighs very accurately, we've now got a CAL curve and we can figure out how much the man weighs. And what he is talking about was the high end of the thing when we used some very heavy batteries, they didn't stay on the scale, in the seat very well.

HAWKINS But I feel sure that can be resolved in some manner or other. We just don't have the fix on it right now. The M110s of blood samples were drawn this morning. And that is a first. Another first in the program of manned space flights, these were done successfully. And we see no problem there whatsoever. Our vestibular function study, the chair has been moved to the right spot, but it has not been checked out yet. Metabolic, well we mentioned the ergometer. The M133, the sleep studies, this has not been checked out, but it will be tonight prior to the sleep. And Joe Kerwin will be monitored throughout the sleep period for EEG, electroencephalograms. I think that pretty well summarizes the medical equipment.

PAO Okay, please wait for the mike so we can get your questions on record. Bruce.

QUERY I've got several. First of all Dr. Hawkins, are they going to sleep in the command module or the MDA or down the wardroom tonight (garble)?

HUTCHINSON Who knows.

HAWKINS I haven't heard. We have not asked them. The temperatures in the OWS I think are right about 85 degrees, which you could sleep in with the drier air. However, I personally would like to have it a little cooler. And my guess is that the crew will probably sleep in the MDA or the command module.

QUERY In moving the specimen mass measuring device, is it the one of the two, is it any more than an inconvenience in losing them? Or is it going to cause problems later on during the flight with any of the experiments, because that is an experiment I understand too?

HAWKINS It is an experiment in itself, and it also supports other experiments -the nutritional studies. Yes, it would definitely impact the M070 studies. Because - -

HUTCHINSON If we lose another one.

HAWKINS Well if we - yes, if we lose another one. We've got to have one, otherwise, you just cannot get those weights. And those are important.

QUERY What is the - in the EREP activation tomorrow, what exactly are they going to be doing with it. Are they just going to be turning them on and checking them out?

HUTCHINSON Well, yes. Basically, it is kind of done in three steps and the first one sort of open the lid on the panel and see that there is no broken glass and the wires are all - it is pretty basic. And you're right. We are going to turn on the instruments. We aren't going to have an EREP pass. We're just turning on the instruments looking at the electronic output from them. We'll be - some of the EREP support gear will be turning on the coolant loop for the first time. We've got to get the tape recorders loaded - -

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HUTCHINSON - output from them will be - some of the EREP support gear will be turning the coolant loop for the first time. We've got to get the tape recorders loaded and there is a bit of a checkout involved in that because we're a little worried about what the heat may have done to some of the tape. We're going to load the 190 cameras, all six of them, for the first time. So it's load them up and push the button and see if the shutter clicks on the cameras and, of course, there is some on-board monitoring capability on voltages and so on and so forth, and it will be fully powered up tomorrow. But it is really just a checkout.

QUERY Did the crew actually ride the bicycle on the metabolic experiment?

HUTCHINSON Yes.

HAWKINS Yes.

HUTCHINSON Level three that's the full protocol.

HAWKINS Yes, that was successful.

QUERY Did they say they were uncomfortable because of the heat in doing this?

HAWKINS We've not had any verbal comments on it. In fact, this was completed while we were coming over here and all I know is the little message they gave me.

HUTCHINSON The crew today - this morning, did call down and offer an alternative to the protocol and we talked about it and sort of gave them their choice. We suggested that they complete the protocol if they felt they could do it. If they couldn't, if he could only make two runs because it was too warm down there we said, well, it's your choice. Decide in real time. They obviously decided to do it all. And they probably sweat a bit.

QUERY You haven't heard the results then of the lower body negative pressure tests?

QUERY Not yet?

HAWKINS We have not and I do not have really the results on the 171 yet. We won't have that really until we get the dump data tonight, which is usually - well, at the earliest, four hours after the experiments are done.

HUTCHINSON And it gets run through 50 computer programs and they look at it for a half a day and - -

HAWKINS Well, we give it a raw look first you know.

QUERY This is a question for both Neil and Dr. Hawkins. What does the temperature look like it's going to level off and if this in excess of the planned value, 72 degrees, do you have in mind further adjustments for the sunshade? And if we are going to have a higher heat burden in there for the balance of the mission, will that impinge in any way on a base-

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line data you've obtained for these medical - biomedical experiments?

HUTCHINSON Well I'll let him talk to the baseline. Let me answer the one about the thermal situation. We have no reason to believe that the workshop is not going to stabilize exactly where we said it was, around 70 degrees. And the temperature profile, as it's been behaving during the cool down cycle, is just exactly what they said it was going to be. Now the crew has described an area. Let me see if I can recollect, I believe it is around water tanks 1 and 3 above the water sampling kit on the wall on the forward compartment, that is warm. It was not described as hot, it was described as warm. As a matter of fact, Pete has said and I won't be surprised if we don't do this here in the near future, that he thinks he can draw a map of the sunshield by running his hands over the wall. And I wouldn't be surprised if we don't do that - sounds like a good idea to me, because we can't see it from inside completely. However, I'm convinced that that small area or small hot spot or small thing that isn't shaded exactly right because we may have a dip in the covering there is not going to upset the thermal balance. Now, if it does upset the thermal balance - it's yours.

HAWKINS Well we've - I guess the most critical experiment from the thermal standpoint - the thermal loads - increased thermal loads that we've seen, would be the lower body negative pressure, the cardiovascular study. And anything - we feel that any temperatures above 90 degrees certainly will affect the results and we're going to have to interpret that data in light of the thermal loads under which the condition - the experiment was run. Below that and certainly in the desirable 70 or below range we should be really back in nominal position.

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HAWKINS - 70 or below range, we should really be back in really a nominal position.

QUERY Have you been able to make any determination of what the effect of all of this activity to launch the repair mission has had or will have on the biomedical experiments. I know there was some concern about the astronauts being out of isolation and that sort of thing.

HAWKINS No, we really have not yet been able to assess the cost of that stress. It certainly will figure into the results and all that we see and we will have to take that into account as we analyze that data very carefully. But right now I just can't tell you what that means.

HUTCHINSON Without it there wouldn't have been any biomedical experiments.

QUERY Can you give us some idea of what ATM work is lined up for tomorrow?

HUTCHINSON In the morning we going to spend about a rev and a half doing the manned portion of the checkout. And the last part of that includes a 4-limb coalign, and please don't ask me to try and explain that, but in a nutshell it's getting the instruments calibrated relative to the Sun, or south. We have right now in the flight plan - there are probably four ATM daylight passes tomorrow, manned. The first one is going to be a synoptic which is the 12-hour, every 12 hour look at the Sun. I have not seen the detailed solar pad - activity pad for tomorrow which is being produced by the team that's on now. It's kind of an average day for ATM I'd say. Not particularly busy and - but certainly a start.

QUERY Neil, you've had an undervolt and a fire alarm, and I just wondered are these - have you solved these? Are these still considered funnies or are they now glitches or they just transients or what?

HUTCHINSON The undervolt you are referring to is the one in the CSM? Well we think we know what caused the undervolt in the CSM. It was nothing more than a case of all our heaters hitting the cycle at the same time. It happened before we got down to what we called our quiescent power level which is considerably below where it happened. We are now currently in terms of loads in the CSM, considerably below where that happened. And we don't anticipate any more problems with it. Fire alarms - we've had two or three. You will recall at the first day of activation we had one that went off maybe two or three times - the same alarm. It was in the center sleep compartment. And these things are kind of tricky, they have sensitivity adjustments on them. And of course they can fail. And of course we have lots of spares onboard and I don't believe, in fact I know, we haven't changed it out yet. We're currently

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running with that fire sensor turned off in that sleep compartment because it was giving us nuisance trips over and over again. We also had a fire alarm in the OWS aft heat exchanger yesterday and the crew - they pay attention to fire alarms - if you've ever heard that klaxon you'd probably pay attention to them too. Anyway they ran up there, opened the box up, the aft heat exchanger's in the airlock aft compartment. It's the thing that cools the air that's going down into the workshop - has four big fans in there - there are two fire alarms - two fire sensors in the box. And he - Pete did it - he pulled the lid off and got down in there with his flashlight and couldn't find anything and so we've attributed that to a nuisance trip also and I wouldn't be surprised if we've got some adjustment to do on some of them. Now, it so happens that that one occurred right in the middle of the South Atlantic Anomaly, which is a known possible causer of phony fire alarm trips and it's not clear whether that is the culprit - -

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HUTCHINSON - - phony fire alarm trips. It's not clear whether that is the culprit or not. However, it could be more than coincidence. I have a feeling it's going to take us a while to get that system down where it's - we'll probably have to do some adjusting. There are individual sensitivity adjustments on the individual - each individual alarm.

PAO Let's take one from Bruce Hicks over here.

QUERY Neil, have the ATM - running of the ATM today, and what we've got tomorrow, are they any more than calibration, are they actually trying to collect data?

HUTCHINSON Tomorrow is, tomorrow is ATM science. And the old scientist snuck in a little ATM science today while we were doing the checkout. As a matter of fact, we spent a couple of passes looking at some filaments that they were interested in where we - Actually our checkout went so darned smooth, we had some pad built into it deliberately and we didn't have any hitches and so a couple of times we left the thing pointed - our particular instrument pointed at a solar feature of interest to the scientists at their request. However, technically science starts in the morning.

QUERY What are these points of interest? And what's the good old Sun doing up there? I mean it's hot down here but - -

HUTCHINSON The Sun is hot and it's - I didn't ever have, in fact, I hope I'll be a little more prepared to talk about things like ATM now that we're turned on and starting to go to work. But, we have - there is considerable activity on the Sun, which is kind of surprising. Of course, as you know, we're in a quiet cycle. And there have been since we have been up there, there are 2 or 3 regions that are producing subflares regularly. So, as you can imagine, there are lots of people who can't wait to get going tomorrow. Active region 14, I believe, is - they had a subflare, at least one, during the crew workday today out of active region 14.

QUERY No big flares yet though?

HUTCHINSON Any flare this kind of time of the Sun's cycle is a good flare, a big flare. But, no, no class C type stuff.

QUERY Dr. Hawkins, has any of the food been opened? And have the heat trays been activated?

HAWKINS No they're still eating the command module food which was sent up there. The trays are all out, but no power has been put to them yet. And they have inspected cans of Skylab food but none of these to my knowlege have been opened as yet.

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QUERY What's your power situation now? How many watts did those two medical experiments take? And what are you going to do tomorrow when you have the ATM going?

HUTCHINSON The power situation is kind of like I described it yesterday. It's one that requires a considerable amount of examination. We're kind of feeling our way along. We have built a flight plan for tomorrow. Right at the moment, as a matter of fact, we are making computer runs. We have some computer programs on the ground that evaluate power. And we're able to simulate the failures that we've had and the amount of power that we have available. And we take a flight plan, in fact we do this every night, we will be doing this every night. We take a flight plan, we evaluate it for electrical power to make sure that we aren't using too much or not putting together things that won't fit together. The flight plan that we have set up for tomorrow has been grossly evaluated. It's being evaluated by computer program now. And we have a couple of areas in it that are very tight. Around lunch time tomorrow there is one that I recall that is up around 4500 watts, just grossing it , just sort of eyeballing it, where the food trays are on and I don't remember what else, several things. The ATM was on and we were getting ready for a - or we were right in the middle of a 92-171. I don't remember the set combination. But, we are observing some restraint in combining experiments, at least until we understand where we are. As far as the run this afternoon goes, I don't have the numbers for how much it took, powerwise. By the way, the biomedical experiments are not big power users, if that's any - I mean, if you compare biomed to ATM - it's like to run a 92-171 run is - -

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HUTCHINSON - are not power users. If that's any - I mean if you'd compare biomed to ATM it's like - to run a 92-171 run is probably 150 watts and the ATM is like 800 watts. So there's a considerable difference.

QUERY What is the effect of losing one of those batteries?

HUTCHINSON One of the CBRM's? It would cost us 1/18th of all the power we have available.

HUTCHINSON Like 6 percent.

QUERY Dr. Hawkins when do they start to eat Skylab food?

HUTCHINSON I always get it mixed up. We have four days of command module food. What is today?

HUTCHINSON Today is mission day 4. Tomorrow morning at breakfast they will eat Skylab food. I knew that because we're using the filtrates.

HAWKINS I've lost track of what day we are in really.

HUTCHINSON We're in mission day 4, tomorrow's mission day 5 and we're out of command module food at dinner tonight.

HAWKINS That's right.

HUTCHINSON So tomorrow we get the big taste test.

QUERY Neil, how is the solar inertial mode working? How is control mode - momentum gyros working and how tightly is it holding it?

HUTCHINSON Absolutely impeccable. We have not used - we have not fired a TACS jet since - well it's been about 36 hours. And we intend that we will continue in this mode ad infinitum. The system's working very well. We're finally flying it the way it was designed to be flown, pointed at the Sun, and it's doing extremely well. We've had the canister pointing system turned on today - it's part of this checkout - and we've been driving the canister around the Sun and that's all working great. And of course, the real test is when we get it pointed at the Sun and the crew is looking at the monitors and can tell exactly what kind of jitter and shake and so on they're getting, which is what will happen tomorrow morning first thing. At best we can tell, it's working great and we're about to home in on the drifts on the gyros here. We've updated two more of them again today and I think it's just a matter of time until that no longer is a problem. They aren't drifting like they were and of course when we are in solar inertial we can get a good hack on them every rev, so it - I think the APCS is in absolutely great shape.

QUERY What's the latest on the probe and drogue situation?

HUTCHINSON Well nothing was done with the probe and

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drogue today except that we had a long discussion with Pete. You know that yesterday we sent up a teleprinter message on some stuff we wanted done to the probe. And I explained it to you yesterday. It was basically, take the head off and look at and squirt it with oil and so on. And we talked to him about doing that today and about some of the special things we wanted him to look at and they may do that tonight. We haven't - if they don't do it tonight I suspect in the next day or so we'll probably schedule them a block a time to free them up so they can spend an hour or two trying to diagnose it.

PAO One more and then we'll call her quits.

QUERY The trim burn still on for about 10 minutes of 8 Houston time?

HUTCHINSON Yeah, let me see if I can quote the time right now. It's at - what time is it right now? Yes. And it's two-jet RCS posigrade - no retrograde noon. I'll be about a minute and nine seconds - something like that. You may not recognize that time. That's because we decided to do it with two jets instead of four jets so that doubles the time. And the reason we decided to do it with two jets instead of four jets - we've lost a temperature measurement - we lost it during the rendezvous in fact on one of the RCS quads on the CSM. And without a temperature measurement we have no way of telling how cold it is so we would have had to go in there today several times this afternoon and turn on the heaters so we could make sure that it was adequate - warm enough to use. And rather than interupt the crew timeline we chose to do the burn two-jet.

PAO Okay. Thank you.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 27, 1973
9:50 p.m. CDT

Participants:

Neil B. Hutchinson, Flight Director
Henry W. Hartsfield, Jr., Lt.Col., USAF, Astronaut

SL-II PC-5A/1
Time: 21:50 CDT
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PAO All right, we'll get started here. On my right Henry Hartsfield the Capcom, and on his right, Neil Hutchinson, the Flight Director. And we'll start off with Neil.

HUTCHINSON Okay, I brought Henry along to see who shows shows up at 10:00 at night on a Sunday night. Give you a little run down on today and it is going to be a little run down. We finally have the attitude vehicle squared away and we are in solar inertial with attitude control system running completely automatically. And we have initiated unmanned checkout of the Apollo telescope mount. And that's all going well. We effectively today finished turning on the workshop and the activation is just about complete. We do have some more transfers and things to do in the morning. And we have to get the medical gear activated, which we'll do after lunch tomorrow and then we've got our first experiment tomorrow afternoon. We're going to do a biomedical run. It will be done on the PLT and the observer will be Joe. We'll be doing a M092 which is a lower body negative pressure and M171, the medobolic analizer. We plan on doing a trim burn tomorrow, tomorrow after dinner. It will be about 29 seconds long, be about 2 feet per second. It will undoubtedly be the only trim burn that we are going to do for Skylab II. The result will put us in a posture for a repeating ground track about 60 miles west of the nominal, as far as our EREP work goes. As you know, we spent a lot of gas getting docked and we have about a total capability, correction capability of about 5 feet per second. So, we're using about half of it. And the way things look now, that's probably the only maneuver we'll do, orbital adjustment every trim burn. As far as the activation today, we had another outstanding day. The crew worked hard from the time they got up until they went to bed. They were just getting to bed here when I left. It went a little slower than we had anticipated. However, I think that's to be expected mainly because there was an awful lot of clean up stuff. The command module was a mess this morning. We still had all the suits in there and everything. And I think we've probably been playing the catch up game today, mainly in the area of just trying to get things neatened up. I think the activation time line we have laid out for tomorrow is completely adequate to finish getting the workshop turned on and I don't think we'll have any problems moving into full orbital operations on Tuesday, Tuesday morning. We activated the air scrubbing system today and it's working great. Temperatures in the workshop have been steadily decreasing. I expect the temperature in there now the air inside is probably around 90 degrees.

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The crew has chosen not to sleep in the workshop tonight. I suspect because it's a little warm. Although we've got everything turned on down there. The water is on and the air conditioning is running and it's completely habitable. Of course they were down there working all day. I'm not sure whether they are going to sleep in the command module the MDA. That wasn't entirely clear, one or the other. The only other know noteworthy thing in the flight plan tomorrow that you folks might be interested in. There will be a press conference tomorrow with the crew. Right now, and I hope this time doesn't end up getting changed, there was some discussion about it being changed. However, I'm fairly certain it's going to be at this time it's probably going to be at 1700 zulu, that's noon, while they're eating lunch. That's noon local Houston time. While they are eating lunch in the ward room. And it will be a television press conference. And it will probably last a total of 10 minutes. So it is kind of hurried. The reason it is so short is the ground track at that particular time that's all the live TV coverage it affords us. And the reason we constrained it to lunch tomorrow is we are trying to get it in with a minimum amount of impact in finishing up the activation activities. Hank, do you want to talk about what we've been doing the last couple of days?

HARTFIELD I don't have anything to add.

HUTCHINSON Okay.

PAO Questions.

QUERY A couple of points. I don't quite understand about the MDA. I didn't hear the exchanges. Is this a joke or could they possibly be sleeping in the MDA.

HUTCHINSON No, it's very - they very well could possibly be sleeping in the MDA. It's sort of a joke to explain the joke. We, when we sleep in a command module in the configuration we're in, we have to get the air scrubbing system that's removing the carbon dioxide from the air is in the airlock module. The way we get that air in the command module is by a single fan which blows through a duct, just like a ventalation duct and blows air into the command module. We don't have any way to tell on the ground if that fan is running. If it were to fail, we would not have air circulation in the command module. And we'd get a build up of PPCO2 in the command module. It would - if it failed right when they went to sleep, and I think I said this last night, I think the number is something like 40 millimeters of mercury after 8 hours, which is no where near the dangerous level. However, the doctors don't like it. Therefore, when we sleep in a command module in this configuration

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we ask one crewman to wear the OBS, the biomedical instrumentation because one of the prime indicators of too much PPCO2 is your respiration rate increases. It's easily detectable. The crew doesn't like to wear the OBS when they're sleeping. I mean how would you like to sleep when you're floating around with a bunch of wires hanging off of you. So it was - we asked them when we left where they were going to sleep and they said we're going to sleep in the command module. We said okay, who is going to wear the OBS. And the answer back was we're going to sleep in the MDA. And that wouldn't surprise me a bit. The other thing about is that the command module is when you're used to that incredable volume, and if you guys saw any of the television today command module is like sleeping in a dog house you know. It wouldn't surprise me a bit if for no other reason than that they should sleep out in the MDA.

QUERY And talking about the doctors. I noticed there was a bit of fuss about wearing this harness last night. Was this raised at the medical conference? Can you tell us a bit about that, this private discussion?

HUTCHINSON No I don't I don't know anything about any fuss about wearing the OBS last night. The reason of course that we asked the SPT to wear it, if they sleep in the command module I suspect that he will wear it tonight is because he is the guy they have the base line data on for CO2. They actually have run some tests on him and they have heart rate and respiration rate responses calibrated against CO2 levels. To the best of my knowlege there was no, and I don't have any first hand knowlege of it, but to the best of my knowlege there was no discussion arguments or anything else concerning the wearing of the OBS at the medical conference last night. As a matter of fact, the medical conference was only a couple of minutes long.

QUERY Why is the trim burn required? Just what does it do to the spacecraft?

HUTCHINSON The trim burn basically is a maneuver which shifts the ground track, I guess is the simplest way to put it, into a situation where it is a orbit shaping maneuver. And it is either posigrade or retrograde. You're either putting energy in or you're taking energy out. And it basically increases or decreases the period of the orbit. And - -

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HUTCHINSON - retrograde. You're either putting energy in or you're taking energy out, and it basically increases or decreases the period of the orbit. And what that effectively does to the groundtrack, if you're going around the Earth in a circular - If you're going around the Earth faster, the Earth can't rotate quite as far under you, and that shifts the groundtrack one way. If you're going around the Earth slower, the Earth can rotate farther under you in a given period of time, and that shifts the groundtrack the other way. The basic idea is to get this groundtrack into a position where it repeats itself exactly every 5 days. And of course, that aids us in our EREP - it's for EREP - and it aids us in our EREP planning because we hit the same sites every 5 days, we pass over exactly the same piece of territory.

QUERY What my question was, what has happened now, that has required the trim burn?

HUTCHINSON Nothing. The trim burn is a standard scheduled item. It's always been there and the reason that, of course, we had very small dispersions in the insertion orbit that the Skylab originally inserted into and, since that time, the maneuvering around that we've done with the vehicle - you know, all those days when we were tipping it up and so on and so forth, plus the several docking attempts that we made before we finally got docked, which put a little energy into the orbit or changed the orbit. I don't whether it put it in, or took it out. I guess it depends on where in the orbit you did it, but anyway, they changed the orbit a little bit and the trim burns have always been in there. There have been several. There were planned to be several. We used a lot of RCS, like I said, during the docking, therefore, we think now we're only can do one. But they've been a standard plan all along. And Skylab 3 and Skylab 4 will have them too.

QUERY Do you plan an EREP pass tomorrow?

HUTCHINSON No sir.

QUERY If not, when is the first one, and what will you be looking at?

HUTCHINSON Let me think. What is today? Today is 148. Day 1. The first EREP passes they were looking at are day 150, which would be Tuesday. I don't know what they're of, but I suspect they're probably U.S. - Continental U.S. There's no EREP pass tomorrow or the next day, for sure, because tomorrow, we have to finish turning on the workshop, and Monday, I mean Tuesday, I'm sorry - That would be Wednesday, by the way, not Tuesday, because Tuesday we have to check the EREP out and that's a several hour proposition.

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QUERY I have a question for each of you, if I may. First, can you tell us what the status is now of the probe and drogue assemblies, and what is the status of your thinking as far as an EVA, to free the solar wing, is concerned? And also, we're having an awful hard time reading the flight plan, as far as which experiments will be performed tomorrow and the next day. Can you give us a kind of basic rundown on the major experiments that are now planned to be performed?

HUTCHINSON You mean in total on Skylab 2, or tomorrow?

QUERY No, tomorrow and the next day.

HUTCHINSON Okay, sure can. I can do that. Let me answer the first question about the probe. Hank, you answer the question about the probe.

HARTSFIELD Okay, Rusty Schweickart's been sorta heading up a group in the office to take a look at the probe and the possibilities of finding out what went wrong with it. If fact, we up-linked a message tonight, set forth a procedure. They might try to take the head off the probe and see if they could find out why the one particular catcher latch was jammed. We won't know until we take a look at it exactly what's wrong, and whether we can repair it or not. However, based on the comments that Pete made, we are sure we can do a safe undocking by assembling the probe and drogue before we put it into the tunnel. And we up-linked that procedure last night. So they do have that procedure on board. As far as the SAS wing goes, we also have some people looking at that. There's some work going on now at Marshall in the water tank looking at how we might free that wing. You probably heard the comments that Paul and Pete made today about what they observed on the SAS wing. We have cut that strap that size with a tool like we have on board. However, we're not sure, from what they said, whether we can get the tool in around the strap to cut it.

HUTCHINSON The angle, sir.

HARTSFIELD It appears, from the pictures and what they said, that the strap is tight against the meteoroid shield and the SAS wing. But, hopefully, we're going to come up with a plan. It appears to us that, if we can cut that one strap, that the wing will tend to deploy itself.

HUTCHINSON The answer on the experiments, as far as the next couple of days go - We are pretty much starting off Skylab about like we had originally intended, and that is that the basic emphasis right at the beginning is to get the biomedical experiments off and running. And, of course, the purpose behind that is, as you know, the total length of time. The very first observations are extremely important, and the ones at the end. The ones in between are important too, but the biggies are to get started. And toward that end, tomorrow, we will be doing the M092-171 run, and that will be on Paul. Paul will be in the lower body negative pressure.

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And Joe will be the observer, and then the next day we will do the other two crewmen through the same experiment, so that by the end of Tuesday, we will have had a biomedical run, a full-blown biomedical run on all three crewmen. Tuesday, as you know, we started the ATM, unmanned checkout. Now, this is a change from the way we originally planned to operate on Skylab, and we did this basically to conserve time. Since we lost some time, the ground has assumed the checkout roll on most of the ATM experiments, and we started that tonight. In fact, it was started here about an hour ago. And that is going to take about 16 hours. We'll be finished about lunch time tomorrow with the ATM unmanned checkout. Then on Tuesday morning, we will start the first crew ATM operations and that will be about 1 and a half, one daylight pass, and maybe a little more of another one of checkout which we can't do on the ground, which they need to do. Tuesday morning will be the first crew work at the ATM panel. Also Tuesday, we will start the checkout of the EREP gear. And, beyond that, I'm sure that Tuesday we will be running - we will be beginning a standard set of ATM work on a regular basis. The first EREP pass, like I said, is going to be on Wednesday. We have already initiated some of the biomedical experiments. The M074 we activated this afternoon. The scales, and we have started weighing food and fecal matter, and we've starting processing urine. Tuesday morning will be an M110 blood letting, or whatever you would like to call it, blood sampling. So we're going to start that. So the obvious emphasis is on the biomedical, getting the biomedical going now. Of course, on the corollaries, you know, we don't have the plus-Z SAL, and I'm not sure - We've already been doing some corollary work in the fact that we've been running around and making temperature measurements everywhere. That's one of the big M-47, I forget all the numbers, but corollary world is going to start getting cranked up probably about the middle of the week. And as you know, we're going to have to be doing some fairly careful management between experiments because we haven't got enough power to go around. We can't run the medical experiments at the same time we got the ATM going. So, there's going to be some juggling, but we're definitely off and running.

QUERY When you do the RCS burn, do all the crewmen have to go back to the CM and shut themselves in or can one do it?

SPEAKER No, it's really a very simple procedure. Basically, the burn is done either at orbital noon, or orbital midnight. There's only two places you do it. It's either posigrade or retrograde. The attitude -

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SPEAKER - basically the burn is done either at orbital noon or orbital midnight. There's only two places to do it. It's either posigrade or retrograde. The attitude control system in the workshop is used to keep the vehicle stable. It's about a - takes about 10 minutes, we don't turn on any guidance equipment in the CSM or anything, all we do is go in there, enable four plus-X jets, and hit the TM on a time. It's a timed burn. We compute it on the ground, how much velocity we want. We know we get 400 pounds of thrust and it's done, like I said, when the vehicle is - if my fist is the Earth, it's done when the vehicle is at local horizontal - exactly at orbital noon. Or if you want to do a retrograde, you just go around on the other side of the Earth and do it at orbital midnight and that makes it go the other direction. It's always done with the four plus-X jets, and we do require one crewman at the ATM C&D panel monitoring the APCS because it's holding attitude for the burn. So, it's a two crewman operation. The entire thing from start to finish doesn't take more than about probably 10 or 15 minutes.

QUERY How many watts of power do you feel you have now?

SPEAKER Well, we have about what we said we were going to have. In gross numbers, our average power producing capability is about 4600 watts. We - with the workshop fully powered up and livable, in fact we've got everything turned on now that we need. We're running about 3600 watts, and we've got about a thousand watts for experiments. And that's just about the numbers we gave you. And to give you an example, the ATM wide open takes about 700 of that thousand, just as an example. EREP full up, takes about 450 or so. Biomed is about that same level I believe.

QUERY You feel then, that you have enough power to go ahead with your first mission?

SPEAKER Oh, very definitely. Yes, sir. We're off and cooking. We're going to have to do a little bit of juggling, but nothing we can't accommodate.

PAO Any more questions? Okay, thank you.

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SKYLAB NEWS CENTER
Houston, Texas

Change of Shift Briefing
Johnson Space Center
May 26, 1973
10:35 p.m. CDT

PARTICIPANTS:

Jack Kinzler, Chief, Technical Services Division
William Schneider, Skylab Program Director
Neil B. Hutchinson, Flight Director
Terry White, Public Affairs Officer

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PAO All righty, change of shift press conference. Participants tonight, starting on my right, Mr. Jack Kinzler, Chief of the Technical Services Division, who was deeply involved in the development of the parasol. In fact, I think it was more or less his brainchild, and incidently, he is a next door neighbor of Pete Conrad. Mr. Schneider who is Skylab Program Director, and Neil Hutchinson, the off-coming Flight Director. Mr. Schneider, would you like to make an opening comment, then Neil, and then Jack.

SCHNEIDER Okay, I don't have too much to say except to say that we've had a very, very successful day. As we had been hoping, the deployment of the shield has been successful and it looks as if things are turning into our favor. And we are looking forward to a very successful 28-day mission. It was a busy day and a very fruitful day. And I think I'll let Neil tell you about it.

HUTCHINSON Okay, well in the presence of an incredible amount of work that we did today, I assume that most of you followed most of the activities that were going on. As you know, we flew, today, the flight plan that we built in the last week here on the ground. With one or two very minor exceptions, we flew it to the letter. got to say that I was just incredibly pleased after getting into the workshop after all the things that have gone on in the last week and a half. And having us turn on about, oh we've got her about three quarters on now, and not turn up any anomalies of any signifcance at all. As you know, this morning, we sampled the gas before we went in just to make certain that the purging that we've been doing over the last few days was successful and, of course, it was, extremely so. We went in and turned on the airlock in the MDA basically. And we went down into the OWS and we sniffed around the gas down there to make sure it was all right. And then, as you know, this afternoon, we went into the OWS and successfully deployed the parasol. The parasol was retracted and the vehicle's been headed back to solar inertial. We aren't quite there yet. We're in solar inertial attitude but we have a little operations to do with the attitude and pointing control system until we can get it back into automatic operation. But, effectively, with in the next hour or so, the vehicle will be back pointed at the Sun. Every orbit, just like it's supposed to be, with the attitude control system flying itself instead of us flying it from the ground like we have been doing for the past 12 days. The temperatures, a lot of them are off the peg and coming down for the first time we've seen, in this mission,

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except for some time period shortly after lift-off, and maybe once or twice when we went to solar inertial for one rev. We did do one extra thing in the activation tonight. Before the crew goes to bed, they are going to install an airduct, interchange duct. It was going to be done in the morning, but we decided to do it tonight. This duct carries cool air from the front of the vehicle to the back, basically. It goes across the OWS hatch from the airlock aft compartment into the OWS air system. And we have a couple, in fact, we have four big heat exchangers in the airlock module which will be turned on tonight. So, all night long, we'll be pumping cool air down there. We expect it to be warm but not particularly uncomfortable tomorrow. I would imagine it is going to be something less, somewhere between 90 and 100. It's kind of hard to say, it depends on how fast it cools down. And we intend to go on with activation for a modified flight plan tomorrow. We will finish turning on the workshop and we hope to sleep down there tomorrow night. Tonight we are sleeping in the command module with all the hatches open, all the way up and down the chain. And I think the crew is kind of tired and we are kind of tired but we're awful happy we pulled this thing off. And it looks like Bill said, we're kind of back on the road to normalcy, if there is such a thing.

PAO Jack do you have anything to say about your parasol?

KINZLER I guess I'll start off by saying that I'm mighty proud to be a part of the NASA team. I've been with NASA about 31 or 2 years now and all my career has been dedicated toward doing what I could for the program. And as a matter of fact, I joined the space test group with Bob Gilruth in the early days and I built up the Technical Services Division. It is sort of a shop oriented R and D support group. And having this group at my command made it relatively easy for me to rapidly construct an object of this type. However, I did think of the idea myself and I thought the best thing I could do would be go to prototype. And I'll just be brief, but it might be a little interesting to indicate how this came about. Pete Conrad, as someone has said, is my next door neighbor. I was quite concerned about Pete being up there and not being able to have a mission. I mean, not really being out, but whether they would go up or not. And so I knew that the center management was looking for ideas and other centers included. And so I started from scratch just trying to determine what might be a suitable protective device. And the thought occurred to me that the package has to be small to fit in

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the command module; it has to be light weight; it has to deploy over a rather large area. I knew the size was in the neighborhood of 20 feet or so, square. So, with that bit of knowlege, I sent downtown in Houston and bought four telescoping fiberglass fishing rods, would you believe, and arranged them in a little square array with the bases of them mounted on springs. And the idea being that if one had spread out a flat canopy, a reflective canopy, and direct a telescoping tube out to each of the corners, you would have the essence or the basics of a deployable device. If you could then fold it 90 degrees into the vertical and close it all up and then telescope it down into a box or package. So I made this prototype last Thursday myself with some of my people. By the way, I'm division chief. I have a group of about 135 people working for me. And so I built this quicky model and I've got a picture or two here I could show you. And everyone else was actively engaged here at the center in trying to develop other ideas, many of which were quite good. The outside sail for example. But, it turned out my idea was deployable from inside the cabin with a minimum of effort and so it kind of got the nod, once we demonstrated it would work. Therefore the next step was to take the concept of collapsible tubes and springs, coiled springs to effect positioning, and combine this into a working model that would be suitable for flight. And I brought a picture or two of that tonight. So, then, the only other problem to this whole effort was amassing enough capability to do what is normally a 3- or 4-, maybe a 6-month job in less than a week. So, once I had the concepts set, I knew I had to get a team together to build. And I enlisted the aid of Mr. Faget's group and Mr. Arabian's group. These are JSC Directors. And all the forces I had at my own command, my own department, if you will, and immediately - -

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KINZLER - these are JSC Directors, and all the forces I had at my own command, my own department, if you will, and immediately in my same building is an engineering design and drafting group. So, the way this thing developed, I made sketches of the parts to be made. I immediately started manufacturing my own facility with my people, and as we made parts, the engineering division followed along as quickly as possible to make design checks, do the drafting and put out final drawings, and what not. Meantime, I was assisted by Mr. Arabian in establishing a test program to proof check the model that was forthcoming, so we had a kind of a flat start last Thursday with an idea. By Saturday I had the first prototype of a metal type aluminum tubing, rather the fiber glass fishing design aluminum tubing telescopeing arrangement, and we demonstrated these to Center management, and they were accepted, so from that point forward forward it was the fastest manufacturing that one could accomplish, and subsequent testing. Now, to have accomplished this manufacturing in a very short time I mentioned a moment ago, I used my shop forces, but we recognized that some of the parts that were available from TO-27 scientific experiment that fit in the same port, that we utilized for deploying the parasol. We knew these parts were available. Essentially a group of aluminum tubes around 1-3/8 diameter, approximately 4 feet long. These tubes were available, and they would be useful for the erection step of deploying the parasol outward. So we used the TO-27 predesigned tube hardware. We called on some of our large aerospace companies to provide us some of these parts that were predesigned, and all, we just made a rush call and asked for some manufacturing to help us. Meantime, we devised the telescoping tube array that actually holds the canopy in place. And manufactured that in House, and to cover ourselves, in event we had a shortage in time, I also put some of the work that we were doing out to some of my smaller sub-contractors. I have a Civil Service shop that works here on the site. We do R and D type work, and we supporting us, some outside small business concerns. So here you see an expanded manufacturing plan, where the Civil Service people that were the creators of this project did as much as they could in the time alloted. I utilized my service contractors that are in Houston to assist us in making parts, and then we went through another channel, out to the large aerospace firms, like North American and Grumman to make us some parts that had previously been designed. All this resulted in a total package, being completed in 4 or 5 days. Now, that was half of the story. The other half was proving that the device would work. In order to do this, we conducted quite a series of perhaps, 10, 12, deployments and repackagings of the flight concept. We did this by hanging the parasol assembly in a vertical position and lowering it downward. So we had a fairly good assurance that the system would work. But, we were working in a one-g environment on Earth here, and some of the problems that presented themselves to us in demonstration were not present up in space. If we could do it on Earth, we were assured we could do it in space. So, that helped out, and we did run vacuum chamber tests where we deployed the device satisfactorily in a vacuum. We deployed it out in the open and in the regular environment, atmosphere, and with that assurance, we just about made it, you know, there wasn't too much more to it. You might be interested in some weights and so on. The parasol assembly is 22 pounds. This includes the canopy, the fabric, and it's contained in a square box 8-1/2 inches by 8-1/2 by 53 inches, and this square box fits a port that is designed to receive experiments of this type in the Skylab, so there's no problem with modifying the Skylab. We just carried an experiment box up to the Skylab containing our parasol assembly. The launch weight of our package is about 77 pounds all told. I think maybe I have said quite a bit here, and I'd like to just hold up a couple of pictures and then cut it for a minute, if I may. Maybe I can turn these through a sequence to give you some idea of the transition. This is a little aluminum canister that I made just to hold the prototype. Here you see the canopy being deployed upward. We have little strings on it, because we wanted to pull it out. We recognized in space it would be pushed out, but we weren't prepared to do that the first day. And you see it emerging gradually upward. It kind of looks like a magician show. Now, it's up and if you look closely, you see some bed fishing poles here, that are protruding to the outside. Now the reason they're bent outward, each one of those is anchored with a coil spring that is pointed toward one of the corners of the deployed canopy, so if you erect the spring in a horizontal position and then turn it 90 degrees, it wants to return to its natural position, so in principle you have a set of telescoping poles, each of which is mounted with a spring, and the springs are bent 90 degrees for packaging. So then we go up. Here we're coming down, and the one in space sort of went through this same sort of maneuver here. I'll

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show you that in a moment. Here we're coming down close to the ground, and there's essentially a flat plane. This is 20 feet by 20 feet. You'll notice this array is concentric, by that I mean, the erection pole is right in the middle. Now, I went through this step without any knowledge of the final required configuration. I knew they had about a 20 foot square, and I knew they had a small port to put it through. I discovered after I built the prototype that the port was close to 8 or 10 feet out of center position. The final canopy is 22 feet by 24 feet, and the pole that erects the 22 by 24 foot array is only 6 feet from one end. So you have quite an offset. you have something about the size of this, instead of the pole being here, the pole is over here on the side, and that calls for quite an adjustment in design, as you can imagine. Let me hold up a few more pictures, and then I think I'll quit here. This is a picture of the actual 22 by 24 foot panel. It's aluminized Mylar over nylon ripstock. Sort of like a parachute silk. I'll just turn this one through, and I think you will get a feel for how this goes. Here we have it on the floor. Can you see these springs here? Okay, those little springs are attached to four telescoping poles, which are oriented out toward the corners. Here, we're beginning - We've got a central pole. This is the push poles, that go back into the cabin, and they were designed so the astronauts could screw one on at a time. And as they advance the device outside the spacecraft, they just simply add a pole. I guess we ought to call them rods. That's the official name. Here you have a view of the telescopic tubes at their closed position. That's about 49 inches tall there. And that's the demension that was my limit based on the experiment canister that I used. Here we have some packageing going on. We had to use parachute packing techniques where you carefully fold and fold the materials into the available space --

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KINZLER - - keeps him going on. We had to use parachute packing techniques, where you carefully fold and fold the materials into the available space so that it will deploy properly when you take it out. Now this is just an ascending stripe here. We are raising and raising the device. Its approximate full height there. Just lost it. Shades of outer space. Now there is a, I mentioned a few moments ago about the center fold being off set. And if order to erect the rectangle with an off set center, I had to use some lines to make up the difference in distance. So in this picture, you'll notice that the upper most poles carry 2 of the corners of the canopy, and here are the two lower corners. This is because as you lift up an off center array, you get high and low sides. Okay, here we are coming down. We are deploying by crain. We've got the scene dropping. This is nearly deployed. Almost completely deployed. And that's it. Now here is the canister on the left. And then there is a picture of the package on the, I'm sorry, I've got myself backwards here. But here is the package and the canister that it fits in. It's quite small when you think about it. I believe that's about all I can show. This is another view that's kind of interesting. It's a very beautiful package, it certainly is. Here, this is the end where we were placing it in the final canister. And we did this last Thursday afternoon and got it down to the Cape quite late Thursday night, and just barely made our deadline. So, I guess that's about all I have to say at this time. I'm very proud of myself and the people who helped us. And we had quite a lot, we had probably 150 or more who worked around the clock. We worked day and night, we lived out at the shops. And there is no other way this could have been done. We had an enormous motivated group of people and that's about it.

PAO Okay, let's go to questions. Would you please wait for the mike. Bruce you have a question back there?

QUERY Neil, briefly we were talking about the Y axis gyro problem again. Is this the very same thing we had last week?

HUTCHINSON It is back with us again and I think maybe we're about to get the gyros under toe here we hope. What he is referring to is just as I was coming off shift, in fact I was just standing there telling Milt what a clean vehicle I was leaving him, the last sight before I left after 16 hours in the place and we had another one of these, I don't like to call them gyro failures. It's where the computer and its little test routine checks the gyros and says it doesn't like it is seeing and then it brings up another one and trys to decide whither there is something wrong with the two that it is using. Basically, I don't ever explained it very quickly what it is, it's the fact that we have not been able to home in on the drift terms on the gyros. And the reason we haven't is because we have been flying around for 12 days without looking at the Sun. Now we've got the vehicle back in solar inertial now and with the attitude control system getting reanchored now on a very inertial body, namely the Sun, we think we are going to be able to tie the drifts and the gyros and this problem will go away forever. You know we have had it for several days. But it's nothing new and there is nothing wrong with the gyros other than we have not been clever enough to figure out how to compensate drifting gyros without an inertial reference.

PAO Over here on the aisle, and then Arthur Hill.

QUERY Mr Schneider, have you done any more tests and tried to determine the durability of the parasol that's up there now? Is it going to last for a long time? Do you forsee the possibility of deploying the twin pole before the first group comes home for example?

SCHNEIDER Well the answer to both those questions is very definitely yes. I think as we explained when we first made the decision, we selected this very fine device that Jack has described because of its ease of operation. We could get in there and we could deploy it very quickly, and we didn't have to train the crews very, too much. The problem, as Jack said, you had to pack 2 quarts into a 1 quart container. And in order to do that we were forced to use a material that we had not had adequate testing on. And indeed some of the testing indicated that it may not last for the full 3 months. But we decided to use that rather than use the twin pole device, which we had more technical proof of the material. I'm not saying that the other will not last but we didn't have the proof that it would last. We decided that we would utilize the parasol and we would conduct tests at both the Marshall Center and the Johnson Center to see just what would happen. We had a test panel that had been tested for 3 days at liftoff day, so we knew we were at least 3 days ahead And we also had some panels that we put in what we call excellerated testing where you use literally use devices that put out ultraviolet at twice the intensity of the Sun. So you, for every day, you get two days worth of data. And we are working on those and have not had any - there

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has been no concrete results out yet and we are still conducting them. We do think that if we have evidance that the material in the parasol will not last there is, well if we have any evidence that it will not last, or if we not have evidence that will convince us that it will last, we will go out and we will deploy the twin pole boom some time later in order to make sure that we have a vehicle there when we go up for Skylab III. Obviously our first pass with the save Skylab and I think that we have, of course it took the ingenuity of a great number of very inventive people and it took the talents of a great number of very dedicated people to join together and get us this vehicle which right now I think is under control. As Neil said, he spent, he spent a great deal of time here controlling a vehicle which was built to be in solar inertial. And I don't know how long it has been in solar inertail but I sure know - -

SPEAKER About 10 minutes and 12 days.

SCHNEIDER And now that we are able to get into solar inertial we think that we'll be in good shape. From my own personal standpoint, I feel that after that flight hardware has been subjected to such off nominal conditions as it has in the past 12 days, I have even higher confidence than I had before that it will behave very well in the upcoming 8 months.

PAO Arthur Hill.

QUERY Somewhat in that regard, I wonder if you could tell us if there has been any more understanding of the docking problem? And I would suppose it is a matter of most concern there, at least to me it is, whether it is going to be possible for the Apollo command module from Skylab I to undock such that another Apollo will be able to dock with Skylab in the normal manner? And also perhaps, you mentioned the parasol lasting 3 months, which would indicate or at least imply that you're thinking of the same amount of time between the Skylab first mission and the Skylab second mission as per the original flight plan. There's been some discussion of that too.

KINZLER Well, I'll let Bill answer the second part. As far as the docking probe goes, well let me tell you what we've done so far. We took the probe out this morning, of course we did an inspection of it, we had a couple of specific questions we asked them. And I think I can tell you what the basic anomaly is, as far as how to fix it, well let me tell you what the anomaly is. One of the three captural latches is sticking in the head, closed, depressed. It doesn't trigger. Now, we were able by fooling

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with the probe this morning, Pete successfully triggered it, recocked it and it stuck again. And then he fiddled wi'h it some more by fooling with the latch on the trigger an it triggered again. So what we got - -

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HUTCHINSON - stuck again. And then he fiddled with it some more by fooling with the latch on the trigger and it triggered again. So, what we've got is two out of three, with one of them sticky, and we're not sure why they're sticking. Now, there are several things, of course it's a mechanical device, there are several things that are heartening about the situation. One is that, you asked the question on whether we could do a normal undocking. As far as I'm concerned right now, the answer to that is unequivocably yes. And the way we would do that, in fact we've already got procedures up to the crew. We sent them up a teleprinter message about half way through the day, today, just in case we had to get off in the next couple of days before we had time to do more probe analysis. I'll tell you what we're going to do in a minute. And the basic technique is this. We're going to take the probe and the drogue in the MDA and put them together, not in the - just out like I was sitting here - the way you can do that is you just stick, of couse at zero-g, it's nice and handy, you can just set them up there in front of you and put them together. And he can manipulate the triggers so he gets the three capture latches engaged in the head. Then we're going to take a rope. We've got a 10 foot piece of rope and attach it on the hatch handle on the MDA hatch. The man just backs out, and what he does, he backs out and he pulls the probe and drogue through the tunnel with him, and the lanyard with him. I'm assuming two men are in the Command Module and this guy that's doing this work has got his suit in the Command Module we're ready to leave - and he pulls on the lanyard and pulls the door shut behind him. And then he can reach up around the probe and the drogue, and pull the hatch handle do and now the MDA hatch is sealed. And he can pull the drogue down into place and reach around the probe on both sides and grab the drogue by the handles and twist it, which locks it into place. And all this time the probe is connected to the drogue with the three capture latches. To put the probe in place and ratchet it up and you're all set to go. Now, as far as what we're going to do with it, we have had a bunch of people working on that all day, of course, and I am not convinced when we're going to do it, but probably in the next few days, in the not too distant future, because we'd like to understand exactly what it is that's wrong with it. One of the things that - One of the distinct possibilities is that it has, as you know, the head is a shiny piece of metal, and I'm not sure what it is made out of, but there is a distinct point - that metal is just to cover over the mechanism, a protective cover, it has no structrual bearing on the matter, or anything else. And it's very possible that that there is some kind of warping or bending or something in the cover itself that's causing the latch - the cover just has three notches in it where the capture latches come through it. And it's possible that the latch is binding on the cover itself, in which case we can just take the cover off and not use it. I suspect, in the next couple of days, we're going to take the cover off and see if - we'll probably loosen the cover bolts and see if that frees it up. If that doesn't, we'll take it clear off. If that doesn't fix it, we'll probably get some oil and squirt in there and see. Of course, that exposes the guts of the mechanism of the capture latch. And like I said, the thing that's heartening about it is, it's not down in the mechanical part, the complicated part of the probe, the spider or anything like that. All of that stuff is working right. It's just in the trigger on the capture latch.

QUERY Could that have been, as to cause, could it have been possibly the long period of soft docking when Conrad described being off, kind of hanging to one side, the command module, vis-a-vis, the Skylab?

HUTCHINSON I really don't know, and I suspect we'll never know. I haven't heard any comments about what the cause might be, and I suspect that after we get in there and find out exactly what it is in there that's hanging up, whether we got a bent capture latch or a bent head or whatever it is, we might have some more insight into that. I couldn't even comment whether that's possible, Art, I just don't know. It probably is possible, but I really don't know.

SCHNEIDER As far as programatic actions. We got a busy programatic day today, too. I have asked the Kennedy Space Center to tell me whether or not they could accelerate Skylab 3, and what it would take to do that. I've asked Marshall Space Flight Center whether or not there's any reason that we should, and I've asked Kennedy - Houston whether or not they have any plans or any problems of an acceleration. I am not saying that we're going to. I would like to, for no other reason than from programatic reasons you schedule your dollars to fit a schedule, and I would like very much to see if we can pick up the 10 days that we lost. I don't know whether that's possible. It might cost more to accelerate than it does to stay with the schedule that we have. So, officially right now, we just add 10 days to each launch interval. But quite frankly, I am looking at what it would take for us to accelerate the program. And I'm not prepared now to say whether that is

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something we're going to do. If we do it, I'm sure you'll hear about it rather quickly.

QUERY I have a couple of questions, sir. What have you seen, so far, as the effect of the parasol on the temperatures inside the Skylab so far?

HUTCHINSON They're going down.

QUERY They are going down?

HUTCHINSON Yes sir.

QUERY To what extent?

HUTCHINSON Well, as far as the temperatures, the interior temperatures that we have, it's going to take a while before they start down. The kind of immediate response we see, of course, as you know the vehicle is fairly instrumented thermally, especially in the OWS. And by instrumented well, I mean there are temperature transducers on the outside, in between the layers of insulation on the inside of the wall, and then on the interior of the vehicle. We are seeing responses already in less than an hour or an hour and a half after we had the thing out, on probably the third layer in of - in other words- on the interior of the skin. And the kind of responses that are the most dramatic, of course, are those that are right there on the skin. And, for example, some of them on the Sun side had dropped 50 or 60 degrees in the first hour and a half that we'd seen it. So, I think the thermal response is going to be just like the thermal folks predicted. We hope that by tomorrow, like I said, it will be like Phoenix on a warm sunny day down there.

QUERY My other question is about the electrical supply. What kind of a projection do you have now on its adequacy and will the solar inertial attitude help boost the output any:

HUTCHINSON Oh, yes, it doesn't help boost the output, but - Well, of course it does. It ends up being able, when we're in the sunlight, to allow us to accommodate some higher peak loads than we are able to accommodate here. The average output, of course, it does not increase the average total power because we've been keeping the power system balanced energy wise by putting back in as much as we take out. Of course, that's one of the reasons we've been having to do a lot of pitch maneuvers. As you know, we have to keep jockying around to keep the Sun angle on the panels at a sufficiently high incidence angle to provide the energy we need. Now as far as power margins go, I suspect that we're going to have plenty of power to do - I don't suspect, I know that we have plenty of power to do experimenting and there is going to have to be some management of the experiments. With the power situation like we have it, there's no way we can operate

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all the experiments full up simultaneously like we'd originally planned. However, I think --

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HUTCHINSON There's no way we can operate all the experiments full up simultaneously like we had originally planned. However, I think right now we're in the process of getting a new power baseline, that is, what kind of power it takes to run this machine with it all turned on with the men in it. And, of course, we have projections on how much we think that's going to be, and, as a matter of fact, we're already starting into flight planning for the first couple of days of experiment operations And, basically it boils down to the fact that when we're running medical ones, we don't run the ATM, and vice versa. And, of course, we used to do that simul and that is gonna hamper us a bit. However, I really expect that you're going to be amazed how much we're going to be able to squeeze out of the thing. We'll tweak it and tweak it until we understand the power numbers and can accommodate things by merely turning off fans, and so on and so forth.

PAO Okay, we'll take one more question here Dr. Campbell, and then we'll go to the Cape.

QUERY How did you come up with the exact color of the thermal plastic substance?

PAO He wants to know how the color got arrived at on the parasol.

KINZLER I don't know the origin of the color but the material is common orange nylon ripstock. I think we started with any available material that was subsequently examined for its characteristic as far as strength, this nylon. And the major advantage of this material was the aluminized mylar. The nylon ripstock is a strength carrier agent. It is a basic material and it is orange. I don't personally know whether the color adds anything.

HUTCHINSON No, that's the way it comes. You got the color free.

PAO Okay. Let's go to the Cape now.

Query Several times since the things has been deployed, the remaining window, or workshop solar array, there has been a reference to the corollary experiments. Which are the corollary experiments? Also, several times today, we have had references to a nominal H-cage maneuver. Can you tell us about this?

HUTCHINSN - experiments are basically, if - Let me see if I can phrase this very easily. If you take the ATM, which is the telescope that looks at the Sun, the medical, all the bio-medical, and the EREP, those three basic bodies out of the experiment complement in Skylab, then corollary, I'd say to the student experiments, corollary encompasses all other experiments in the vehicle. And some typical

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ones are the ones like, the backpack, the maneuvering backpack is classified as a corollary experiment. The furnace that we have up in the MDA, that we're using for metals melting and so on, that's a corollary experiment. Many of the things that we stick out these airlocks in the back of the vehicle, like S020 and like the thing that was going to be out the airlock that we're using now for the parasol, that was a corollary experiment, T027, and there's a lot of them. I don't have a ready list here in front of me but there must be, I guess, about 30 experiments in that category. The other question on the nominal H-cage - I hope you've heard that term for the last time. That was a technique that we use to reinitialize the momentum in the control moment gyros. It's part of the attitude control system, and we've been having to do this from the ground manually, on a regular basis, because the vehicle was flying around at this half-cocked attitude, not in solar inertial. The vehicle does this on its own when it's in solar inertial. When we do it in that manner, it's called a gravity gradient dump, and it's a way to use the torques put on the vehicle by gravity to get rid of the energy that the vehicle has to move around. In other words, it's a way to hold the vehicle inertially stable in orbit.

SCHNEIDER Yes, I don't have anything to add to that very fine description, but I do have something that I had neglected to say that came to my attention today. I had previously announced the various experiments that we would not be able to do. And today, I suddenly realize that we now have a large container sticking out in the area of the experiment compartment. And that brought to mind that one of the experiments, one of the corollary experiments that has previously been called a candidate experiment. That is, an experiment that we had on board that we had not expected to do on Skylab 2, but had hoped to do on Skylab 3 or 4, cannot be considered a candidate, namely the backpack - the M-509 astronaut maneuvering unit. I will not permit that to be used with that container in there because there would not be enough free space. So we'll have to, in this mission, delete that experiment from a candidate experiment to one that will not be used on the first Skylab manned mission. If in the event, we deploy the twin-boom thermal shield, why then for Skylab 3 and 4, it can, of course, be reconsidered as a candidate experiment, or a scheduled experiment. But with that canister sticking out in the middle of the workshop, I'm sure Neil agrees with me, we would not want to fly it.

PAO Okay, I understand there are no more questions from the Cape. J. Conrad Russell, do you have a question back there?

QUERY What's the configuration for the crew tonight?

HUTCHINSON They're sleeping in the command module. We've got all the hatches open, all the way down the line, from the CSM, MDA, both airlock hatches, and the OWS. We're using the OWS or the airlock O2N2 system for oxygen and we're using the mol sieves for CO2 removal. We will put a sieve on tonight before we go to bed. We've got the standard fan that blows air up into the command module with the air interchange duct lying across the hatch and blowing up in there. We have one crewman instrumented with the biomed system. If fact, I think Joe got the nod tonight to wear it. And the reason we're doing that is we have no way of monitoring that fan that's blowing the air up in there, and we didn't want to take a chance with PPCOO2 buildup in case that fan were to get out on us. So we put a biomed instrumentation on Joe, and we can watch his respiration rate, which is an outstanding indicator of high PPCO2, if for some reason anything should go wrong with that fan. If anything goes wrong with the fan, the PCO2 build up, I think somebody told me if it failed the minute they went to sleep and nobody woke up all night, I think it would be like 40 millimeters of mercury, which is not even - The doctors don't like it, but its not gonna hurt anybody. However, we have taken that precaution.

QUERY Did Mr. Kinzler also invent the name sunshade tree, SST, and if not, what does he think of it?

KINZLER The name is Skylab parasol. That's the name we chose. It's on our drawings and I never heard of sunshade tree until it came out of the press, or at least out of - from somewhere.

SPEAKER It came out of the flight plan - today's flight plan.

SCHNEIDER I'm sorry. We had a great deal of difficulty even within NASA, trying to keep track of the various options that we had, and if you recall, one of my daily reports, I spent a whole paragraph trying to assign names to descriptions so that it would become a little bit clearer, not only to you, but also to me. And we selected various names and one that was selected for this, kind of by -I guess kind of by mutual choice, was parasol. The people who are doing the flight planning didn't read my report, and they picked up their own name, and we've had the dual names ever since.

QUERY My question was, Mr. Schneider, what kind of plans are you looking at right now down the road for the - I know you got a probe and drogue problem, but of trying

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to go back out and freeing the solar wing on the workshop?

SCHNEIDER That's most interesting. We are not restricting ourselves to any set game plan, if you will, right here. We are exploring all --

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SCHNEIDER - - ourselves to any set game plan, if you will, right here. And we are exploring all kinds of potentialities. Today we had some people in the water tank at Marshall who took what they considered to be the most logical configuration of the solar panel to see what they could do. And they had some fairly interesting results. We're not sure that they're conclusive or that they really indicate that we can do any thing. But, we are continuing to pursue the idea that it may be possible for us to further deploy that solar array. As we told you for the past few days, we thought that Pete and his crew their major contribution to that solar array problem was going to be in telling us what the problem was and giving us enough data to come up with a solution. We have had some good television pictures and we are continuing to look at them. We think we know better now what the problem is, and we are trying to work out a solution. If we think we understand the problem and if we think we can do something, we will not hesitate. We will attempt to deploy it. I'm not saying we are going to, I am merely saying that we have not closed the door to any further activity there.

PAO Dr. Cambell

QUERY What are they wearing tonight?

HUTCHINSON Flight coveralls, I would assume. They are in their standard flight coveralls, nothing special. One thing that I want to mention that I forgot to say when I was sort of giving you a run down, something you might all be interested in. The crew had the television camera up in one of the CSM windows during the parasol deployment. It was all, we didn't see it of course real time, it was all recorded on the VTR and we have made arrangements to dump it at Guam. And I'm not sure, but it is coming up here in about an hour or so and we have got ourselves some lines normaled through the Pacific satellite, and we'll be bringing it back here real time. And we should see two sets of sequences on it. There's about 17 minutes of tape on the VTR. And we aren't going to be able to get it all back to Houston. But at 2 passes at Guam we're going to get 2 whacks at it. And we are going to take the first part of the tape, the first 5 minutes, which ought to include the thing folding out and then we are going to get the last 1 minute in the middle and then the last 4 minutes which ought to include what it looks like from the CSM and in its deployed configuration as they started to retract it back down. And I don't know when that stuff is - I'm sure it will be on the monitor wherever you are pretty soon.

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QUERY What is the latest status about those wrinkles we heard of or if the umbrella deploying to complete satisfaction by now?

HUTCHINSON Well, I think, Jack may want to comment on this, I personally that the wrinkles, in the first place that thing was very cold when it went out, extremely cold. And as you might have recalled when Pete, when they were bringing the rods back in after they had put it out one of the rods Pete commented had frost on it. Down in that 125 degree OWS here is this rod that is covered with white frost, because it was, it is very cold out there. And I suspect that after - well two things. Number one, the back 2 rods after the description we had, and we haven't seen the pictures. We're going completely on a verbal description. But, like Jack told you, this thing is you know it is off center. And there is more material towards the aft end of the vehicle than there is toward the front. And the back 2 rods didn't come completely up cold planer with these 2 rods. Now that may have contributed some to the wrinkles. We think that pulling it down on the OWS, if anything else, will help to stabilize that as a planer surface. The second thing is, when the heat gets on it it's going to tend to lose this memory that it had when it went out and was crimped from its package and very cold. And we suspect that will do it. And as far as we're concerned the thing has deployed completely nominal.

PAO Any further questions? Mrs. Cambell

QUERY Is the parasol like the like the bottom picture in this diagram?

SPEAKER Yes it is.

PAO One more then let's shut her down.

QUERY I have a question refered to me by Brian Webb and Tom Logan with Griffin Observatory with the Griffith Observer. They want to know when and if the when the Apollo telescope mount will be powered up to observe the Sun. And if they dug into any of the Skylab food? And if so does it taste funny?

SPEAKER Well I can answer both of those. First off as far as the ATM goes, as you know we changed our plans significantly on how we were going to turn the ATM on for several reasons. One we were trying to do it as soon as possible with the delayed activation that we ended up running here. And 2, we decided to do as much of it from the ground as we could. Now we are going to start tomorrow night about 8:00 Houston time turning on the ATM instruments from the ground. We will run about 16 hours of checkouts from

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the ground almost continuously as we go around the Earth, of course we can only do it when we're over a site most of it. And that means that, let's see what is today, well starting tomorrow night and then 16 hours from then which makes it about noon of the 4th day, the telescope mount will be essentially checked out except for about 1 rev of daylight work which the crew needs to do. And I suspect that the first the crew, let's see the way tho flight plan goes now I believe that the crew will be doing that 1 rev of checkout as soon as or that afternoon or the first thing the next morning. So it is about 2 days from now roughly. And as far as the food goes, the answer to that is no we are still eating command module food. And the first command module food is the standard plan. We planned on doing this, we have 4 days of command module food. The first food will be eaten on day 5, breakfast.

PAO Thank you very much.

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SKYLAB NEWS CENTER
Houston, Texas

SL-II Post-Docking Press Conference
Johnson Space Center
May 25, 1973
11:38 p.m. CDT

PARTICIPANTS:

Bill Schneider, Skylab Program Director
Leland Belew, Marshall Space Flight Center, Skylab Program Director
Kenneth S. Kleinknecht, JSC Skylab Manager

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PAO Press Briefing. It's no longer a change of shift, I guess, because of the activities that did occur. For obvious reasons, we were not able to hold it earlier because of the any decisions that had to made during the evening. We did get the good news of the hard-dock, as you all know, just a short while ago. Now we have here at the News Center in Houston, for the benefit of the people at the Kennedy Space Center News Center, the project and program management people. We're hoping that the two flight directors, who were involved in the mission all day long and all this evening will be able to join us. Don Puddy is the flight director for the orbital workshop during this long shift and Phil Shaffer was the flight director for the Command Service Module portion of the mission today. Both of those gentlemen are still on duty after a long day and we hope they will be able to join us here, but we thought it would be best to proceed. We have here in the News Center to the left, to my right, as far as the news people here Houston are concerned. Mr. Ken Kleinknecht, who is the Skylab Project Manager from the Johnson Space Center. Mr. Bill Schneider, who is the Skylab Program Director, office of manned space flight at NASA. And Mr. Lee Belew, who is the Skylab Project Manager from the Marshall Space Flight Center. Bill, Perhaps we could start off with just some brief remarks, and then go right into questions. I think, hopefully, the news media are up to speed on the events that have occurred. We will attempt to answer questions.

BELEW Okay, I will keep my remarks brief. It has been a very long day for, not only you, but also for us. We consider it a pretty successful day. We did have a beautiful countdown, and a near perfect launch, and a precision rendezvous, right on time. And then we did our standup EVA as expected. Unfortunately, as I've been predicting, we had a very low probability of deploying the solar panels. Unfortunately, the crew found that they were unable to do that. This did not come as any great surprise to us. It did come as somewhat of a disappointment, but, as I've been telling you for the past five days, we have not been counting getting that electrical power, although, I truly admit, we would have had an easier mission if we'd gotten it. And subsequent to that, we did attempt to redock, and I'm sure I don't have to go through with you the attempts at redocking, which kept the flight directors and the flight controllers quite busy. However, at this time, we are redocked. We are right back were we had expected to be. We are perhaps an hour or two behind schedule in getting the crew back to sleep. We will therefore, undoubtedly pick up

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tomorrow a couple of hours later than had been expected. I don't know exactly what time we'll wake the crew, but it will undoubtedly be about 8 hours after they go to bed and we fully expect to pick up tomorrow where we left off today. We'll start, probably with a debriefing on the standup EVA exercise and proceed right on into the entry into the workshop and the deployment of the Skylab parasol, and hopefully if that is successful, which we again expect it to be. And this time we think we've got a very high probability of it being successful. We will then proceed on with normal activation and hopefully in a few days, we'll be right back on our Skylab timeline for what is still considered to be a full 28 day mission. I can't add much to the excitement and suspense of the day, so I quess we ought to go right into our question and answers.

PAO Okay, thank you, Bill. We'll start with questions here in Houston.

QUERY Bill, I got several here. First of all the obvious question is the impact on the mission overall; With the problems in docking tonight we were having, will you anticipate another attempt to go out and work on the solar panels or anything else like that?

BELEW I think we'll wait until we have the crew debriefing tomorrow on that, before we make any decisions as to what we will do. It obviously depends on what the crew says on the solar panels, and also what they find out what was preventing us from docking. And those two will be played one to the other.

QUERY And is also part of that - Are we back to talking about what we were discussing a number of days ago? Without these solar panels that we would probably have a nominal or basic nominal 17 day mission, and a - say a power down, or a little reduced activity 11 days after that. Would that be in the offing?

BELEW That's the way it looks right now. I think some of you might have heard, we have had one of our batteries act up on the workshop, and we have 18 of them on board. One of them failed to switch back and Mr. Belew might be able to say more about that, which at this point, of course the crew, when they get up there, can recycle them but, they'll merely be commanding from a switch, rather from a ground command, asking the batteries to do the same thing, so our position on power is not quite as rosy by 1/18 as it was yesterday.

PAO We've got a large crowd at the Cape. I'm just going to jump around here, and take one question from

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each and as sizeable we'll go up at the Cape. We want to be fair about this. Reggie, go ahead.

QUERY One got the impression that Wietz had to get back into the Command Module in a bit of a scramble at the end of the SEVA, and was knocking against the switches. Is there any feeling here that that was linked with the later docking troubles?

SPEAKER No, I don't beleive we have any feeling here that that was linked with the docking trouble. You know in a suit, they're all three hard suited, they'd had the tools out. I don't know exactly how many tools that they used. I suspect that they must have tried all of the tools, so they had some tools laying around that they couldn't stow back properly, and it's just, with three inflated suits in there, it's a full vehicle, in addition to all the stowage that we added in the last two weeks. We had - did do switch checks, all the switches associated with the docking system and breakers were rechecked and verified and I don't believe that had anything to do with it. However, we've had very little contact with the crew since then, and we may learn more about that tomorrow, too. Or when we get back on the network and they are rested.

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SPEAKER -- back up here.

SPEAKER -- went into the tunnel and did the hot wiring?

SPEAKER I don't know.

SPEAKER They did that out of station contact.

SPEAKER We'll check that for you. That question was raised. It is easy to find out, and we'll get that answer for you.

SPEAKER We can tell you tomorrow, I'm not sure we will know tonight.

QUERY Given the nature of the docking problem, and this is two parts, do you anticipate any difficulty in undocking and would the procedure necessary to achieve a successful docking require or have any impact on your decision to do another EVA with respect to the difficulty of redocking later on?

SPEAKER I don't think it would influence, significantly, undocking. It would appear now that we will not be able to use normal procedures for undocking. However, there again we do not know exactly what happened. We do know that they used - the only procedures that were used were procedures that had been developed prior to the flight. And indeed they were procedures that we had in Apollo. There was the first attempt was a normal procedure, the second procedure was to extend and release the probe twice and try again and to repeat that - did not dock. We then proceeded to put a jumper around the electrical system, the logic system, that would make the probe think that we did have capture. Then we went into a mode of pulling up to the MDA retracting the probe, and as we retracted it, used the RCS to bring the spacecraft in, so the probe didn't know whether it was captured or not when we got a very well aligned mating there. When we mated the 12 latches all worked, and if you recall, they must have been very good because on some of the Apollo missions all 12 latches didn't work and that is not a serious consequence. Now as far as the undocking, the people are working tonight, the probe specialists, to develop a plan to inspect - to look at the probe see what they can do. And they will be planning what is our way to back out if we want to undock. At this time I wouldn't say, and as Bill said, whether we would do another EVA or not. Now you know if we go to the parasol, we try to put that up, that does not require an EVA. At the present time, the second choice, if the parasol does not work, is the twin boom sun shade. That's an EVA from the airlock module. And the last would be to put up the SEVA sail. If you put up the SEVA sail at the end of the mission when you leave, you would undock and you'd come home, you wouldn't want to dock again. We certainly want to get the thermal situation fixed so we don't have to work like we have for the last 2 weeks oefore we go back again.

SPEAKER Okay, I'm going to take two more questions here since they have their hands up and then I'm going to go to the Cape and then we'll come back if we can, okay!

QUERY Would you say that there were six attempts, total attempts - -

SPEAKER I do not know. I know that there were several. I know that there was the four procedures that are normal procedures had all been developed. There was one thing that I left out. The reason that they had to go EVA was not to hook up this cable. You can do that without going EVA. But since the capture lines were not working, we had to go EVA to remove a cover off the back of the probe, because a shaft had moved. It quite likely was not aligned to come back and if we had retracted in that position then we could have damaged the probe so it could not be used again.

PAO Okay, up here.

PAO This one, this one, and Angus over here. Right over there is fine.

QUERY In light of the 17 days and 11 power-down probabilities this mission, what are you thinking at this point on the two longer ones?

SPEAKER Well again, we're not quite sure just how much we will have to power down. A lot will depend on how the systems behave, and how much electrical power we generate at the high beta angles. As far as the 56 day mission is concerned, we are looking at a number of things. One of course we've already started thinking about are tools to cut the angle that the astronauts have found up there. And secondly, we're looking at some other materials which we might be able to bring up which might provide us with a little extra electrical power. So all I can say is, right now, the 56 day mission is still in our plans and it will be in our plans until we find out that we cannot do it.

SPEAKER I think we might add, we have enough power to do a 56 day mission if it could be reduced in the number of experiments. But it would appear at this time, if everything else stays as it is now, that we could get the majority of the medical data. That is extremely important that we get that medical data for any future missions of longer duration. We could continue to get some ATM data and some Earth resources data. Some of the corollary

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experiments do not take much power. It may be a blessing in disguise for the corollary PI's because they don't use much power.

QUERY Did you use more propellant for the different rendezvous attempts than you anticipated? And if yes, could this influence your decision on future SEVAs?

SPEAKER Yes we used more than we anticipated because we did more maneuvering. But not more than you would expect to use with the amount of maneuvering. So, we have used more propellant, but we are not on any red lines yet. We still have enough propellants to do what has been planned.

SPEAKER I'd like to add, we certainly have not ruled out any additional standup EVAs. But, we right now have no more planned. We may add them into the plan, but we just made our attempt.

PAO Okay, Angus.

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QUERY I guess Mr. Schneider just probably answered my question, but just to get it clear, assuming that your first two options on the parasol and the twin pole sail were to prove unsuccesful you would still hope to do an EVA on the SEVA sail despite the docking problem.

SPEAKER Well, again as Mr. Kleinknecht said, if you had we have to get a thermal shield up there fairly rapidly. And if we have a serious problem with the docking probe, we would undoubtledly - which would prevent us from docking again, we would undoubtedly - I say undoubtedly right now - I believe at this point that what we would do would be separate and deploy the SEVA sail and then go home. Because our first priority is going to be save the workshop and if we don't get a thermal shield up there why - we're having quite a management problem as you know - management of the thermal and electrical systems and it's causing us to use a lot of propellant to do that. Quite obviously we've got to get that under control. So if we have a serious docking problem and the other two methods fail we would go ahead, undock, do a SEVA, and then come home.

PAO Okay, we'll now switch to the KSC newscenter for questions, please.

QUERY I hope I'm not repeating a question a question which was asked before, but some of the communications from Houston were a bit garbled here. What exactly was done to the probe when it was in the Apollo spacecraft? And do you at this time know exactly why that last docking succeeded when the others did not?

SPEAKER If I interpreted your question right, you think that we took the probe out and brought it into the spacecraft. We did not take the probe out. We took the hatch out which gave us access to the probe. And the reason for doing that was to remove a plate off of the back end of the probe so that when it did retract, a shaft in there could move and not damage the probe. Now, on the last docking on the last attempt which did give us a hard docking we bypassed the electrical logic in the probe system that told the probe that the capture latchs had indeed captured when they had not. We then pulled up to the - used the probe and the drogue for a centering device using RCS thrusters pulled up into the drogue, started the probe retracting - it was not captured - the capture latches had not captured, so it did not pull the spacecraft in. In lieu of that we used the RCS to push the spacecraft in as the probe retracted. So as far as the latches are concerned, they thought everything was normal when the command module came in contact with the surface of the MDA side of the probe. All 12 latches said I'm ready to

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go and they just went through a normal sequence and latched.

QUERY Could someone there describe the tools or the methods that we used in an attempt to get the solar array deployed?

SPEAKER I'm afraid they were out of radio contact with us at that time, so we don't exactly what they used. We had hoped to have a debriefing session but we did not. I believe we covered the tools that they had onboard the last couple of days. They had a hook device, they had a wire and bolt cutter, and they had a kind of a ... Did they have any others onboard?

SPEAKER Those were the ones that would have done the job. It was attempted as indicated we don't really know exactly what they used other than the one kind of a double-pronged tool that would be used to twist or pull. So, we really don't know what other tools they used.

PAO No more question from the Cape.

PAO Okay, we'll take one more here and then we'll get some tired people home.

SPEAKER Bill, or anybody who wants to try this one. Why have we had so many problems so far? You know it's been one right after another.

SPEAKER - before you say anymore. I don't think we've had very many problems. As a matter of fact it's been a very, very good day. We had a very smooth countdown, we had almost a perfect trajectory, we had a good rendezvous, and we did the standup EVA, and that went very well. Pete was able to station-keep with the vehicle, he had no trouble getting in there close, they did use the tools. Unfortunately the tools we had were not designed to cut aluminum 7075 ST-6 angle - I think 1/16 inch thick, 1 inch by 3/4 inch, and it appears from what we have been able to understand by the crew's communication, that that is the part that is holding the sail - the solar arrays down. They did put in a very long day - you can tell by the voice that there was no irritability and things went very well. So the docking as far as I can see is the only problem we had today.

QUERY Both missions we've had - you know - a series of problems - we have a battery that - I understand - that - -

QUERY That didn't happen today. That happened yesterday.

QUERY Okay, I'm talking about - - I'm not talking about today.

SPEAKER The system is able to accommadate a battery failure. It's unfortunate that it happens when we had already had to operate at reduced power. There is a possibility

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that we may recover from that too. When the crew gets in they can cycle the switches and sometimes that will clear up such problems.

QUERY Okay, going back to one question that was raised - which of the crewmen performed the EVA function as far as the docking was concerned? We do not have that man identified right now - it's not available as far as mission control is concerned. If the crew volunteers it before they go to sleep or perhaps I don't know - perhaps they are already starting that now - we'll pass on the information as soon as we get it. Otherwise, I'm sure the question will be raised in the morning and we will get the answer to you. We'll be open all night. There will be a commentary - a commentary report throughout the morning hours, and I guess that pretty much winds it up for this evening. Thank you very much.

END OF TAPE

SKYLAB NEWS CENTER
Houston, Texas

SL-II Status Briefing
Kennedy Space Center
May 25, 1973
9:00 a.m. CDT

PARTICIPANTS;

Walter J. Kapryan, Director, Launch Operations, KSC
Charles Hollinshead, Public Affairs Office, JSC

SL-II PC2-1
Time: 09:06 a.m. CDT
5/25/73

SPEAKER 1, 2, there we are. Would you ask questions, please wait for Ted so he can point out the different ones asking questions?

SPEAKER Okay, we have with us this morning Mr. Walter Kapryan, Director of Launch Operations, at Kennedy Space Center. Mr. Kapryan.

KAPRYAN Good morning, ladies and gentlemen. Well, we had a very nominal countdown. Was a very few - very minor problems, really not worth discussing. I guess - I guess the most significant thing, of course, was the fact that we did get a lightning strike. Just before 5:30 yesterday afternoon, it struck the mast of the mobile service structure. It did affect the spacecraft slightly in that one of the gimbo gyros did tumble. We shut the IMU down; we did a full guidance and navigation retest, and everything worked well. We actually had no problem other than that one incident. We did also run a lightening retest test plan with the launch vehicle and had absolutely no anomalies whatsoever. As you know, due to the refinements that were being made to the stowage configuration, we did decide yesterday morning to start propellant loading of the launch vehicle 3 hours early. And I guess it's a good thing we did, because the last piece of equipment touched down at Patrick at 12:27 this morning. It was a - an item that had to be attached to the T027 canister which had arrived a few hours earlier and delayed the transfer of that equipment to the launch complex until on the order of 2 o'clock this morning. By virtue of having started the propellant loading 3 hours early, we did get that done on schedule at 12:45. Had actually no problems whatsoever. We did have a recurrence of the - of losing the open indication of the liquid hydrogen fill-and-drain valve for the S-IVB. If you recall, during the countdown demonstration test we had to revert; that cost us some time. We anticipated the same problem this time and went into a manual mode from the very beginning. We did lose the indication when we got to slightly over 50% again today, but we did not get a revert, since we were in a mode where we could handle it. As far as the stowage was concerned, we got done with the stowage I'd say about an hour and 20 minutes before the crew came out to the - to the launch pad. So we had a lot of time. We could have got equipment in an hour and 20 minutes later and still made it. But everything went in well. There were no problems as far as stowing this equipment was concerned. Shortly before we - before liftoff, about 35 minutes before liftoff, some concern was expressed with respect to a higher pressure in the propellant storage module manifold than was desired. It was at 50 psi, at which point it had been for quite some time. However, the systems experts, in analyzing

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the potential of this DELTA P thinking in terms of a possible air bubble being in the manifold, could cause a hard start when the engines are fired in orbit and could cause a catastrophic failure with those engines. The remedy, of course, was to bleed down the engines, which we did do, or bleed down the manifold, rather, which we did do at about T-30 minutes. And that was really about the most exciting occurrence we had - off-nominal occurrence we had during the - during the count itself. We did have a little bit of concern for the weather, but as you know though, it was cloudy and you didn't see very much; it really didn't bother us. Liftoff occurred approximately 230 milliseconds after the planned schedule time. All of the performance parameters are very nominal. At S-IVB cutoff, beginning of time base 4, we had hoped to be at 25, 825 feet per second. And we were within a very few feet of that. I guess there really isn't anything more to say. I'm just going to throw it open to you to ask some questions if you have any.

QUERY Kappy, were you ever able to get those weight figures on how much was actually taken out of the Apollo? Exactly how much weight was put in and what the liftoff weight of the Apollo was?

KAPRYAN I didn't get it, Mary, because shortly after I got home, we had the lightning strike, and I came back out here, and I was too busy. I told Chuck to pass that on to you, but I guess he didn't do that.

QUERY Can we get them?

KAPRYAN Yes, I'll see that you get it.

QUERY What about the pedestal that the rocket was sitting on? What condition is it in, and what's its future?

SPEAKER Well, I left the firing room before anyone was actually at the pad to look at it, but from the cameras and looking through binoculars, it looked as though it was in very good shape.

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SKYLAB NEWS CENTER
Houston, Texas

SL-2 Prelaunch Press Conference
Kennedy Space Center
May 24, 1973
1:00 p.m. CDT

PARTICIPANTS:

Dr. Willard R. Hawkins, Deputy Director, Medical Operations, JSC
Richard G. Smith, Skylab Program Manager, MSFC
Glynn Lunney, Skylab CSM Manager, JSC
Walter J. Kapryan, Director, Launch Operations, KSC
William C. Schneider, Skylab Program Director, Office of Manned Space Flight, NASA Headquarters
Kenneth S. Kleinknecht, Skylab Program Manager, JSC
H. William Wood, Associate Director of Operations, GSFC
Col. Alan R. Vette, USAF, Department of Defense, Recovery Forces
Charles Hollinshead, Public Affairs Office, JSC
Donald K. Slayton, Director of Flight Crew Operations, JSC

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PAO To get on with our conference, on my right, Donald K. Slayton, Director of Flight Crew Operations at the Johnson Space Center. To his right, Dr. Royce Hawkins, Deputy Director from Medical Operations Flight Sciences, Johnson Space Center. On his right, Walter J. Kapryan, Director of Launch Operations here at Kennedy Space Center. To his right, William C. Schneider, Skylab Program Director from NASA Headquarters. On his right, Mr. Richard G. Smith, Saturn Program Manager from Marshall Space Flight Center. On his right is H. William Wood, Associate Director of Operations from Goddard Space Flight Center. And on his right, Colonel Alan R. Vette, U.S. Air Force, Department of Defense Recovery Forces. We also have in Houston Kenneth S. Kleinknecht, Skylab Program Manager from Johnson Space Center, and Glynn S. Lunney, Skylab Command Service Module Manager, also from Johnson Space Center. We'll start our conference with Mr. Schneider.

SCHNEIDER Good afternoon, ladies and gentlemen. Yesterday, the senior officials of NASA held a very comprehensive review of exactly where we stood for the upcoming Skylab-2 mission. They examined the condition of Skylab 1 as it is in orbit and as we expect it to be when the flight crew gets there. Briefly, as I said yesterday, the best - our best estimate of what the vehicle looks like from an external standpoint is that we believe one solar panel boom has left the vehicle, and we believe the other solar panel is deployed about 5 to 10 degrees from the side of the vehicle. This situation seems to best fit the telemetry signals that we're getting and seems to best fit our rationale as to what happened. Now we reviewed yesterday the tools that we will bring on board for some limited activity by the crew to - if it appears feasible to them - to deploy that remaining boom. We don't hold too much - we're not too optimistic that we'll be able to do too much, although we will give Captain Conrad the option to try if it looks as if it's a reasonable job. In any event, we do expect - if we cannot deploy it, we do expect to take a great number of photographs, which we would then analyze to give us a better opportunity on Skylab 3 for deployment. We also looked at what kind of electrical power we'll have available and examined what kind of a mission we would be able to perform. Most importantly, however, we've looked at the various options that we had available to us for putting a thermal shield on the vehicle in an attempt to get the vehicle temperatures back to normal. We ended up after a very - well, a lot of conversation and so, after having come to grips with some very difficult decisions, because we had a great number of options to choose from, each of which had good points, bad points, and we ended up selecting, last night,

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as our prime mode of deployment, the so-called Skylab parasol. This is the shield which is deployed with four telescoping rods through the scientific airlock hollow position within the spacecraft. We preferred that because the - it was from an internal position to the spacecraft, and we did not require extravehicular activity, and it looked as if it had a very high probability of a successful deployment. At that time, we had some question about the material that the sail is made of, and the Johnson Space Center, where that device is being fabricated, went back to make some minor - some modifications. Our second option that we chose was the one that we have labeled the two pole thermal shield. These are the twin booms that are put out, back from the ATM position, back over the spacecraft, by two astronauts who would be extravehicular in the vicinity of the ATM. We also found room in the command and service module for still a third method, which we would consider as a third option, and that is the one that has been labeled the SEVA thermal shield. This is the one which would be deployed - SEVA being standup EVA - which would be deployed using the command and service module with the astronauts, with the hatch open, with a long pole attaching the sail to the workshop. However, we did have some questions at that time, and still do I might add, about the primary device, and so we had the Langley Center continue their fabrication on the device which is an inflatable device which is also put out through the scientific airlock. I might add that both of the devices which are placed outside the vehicle through the scientific airlock utilize the T027 canisters, and they are both ejectable; that is, in the event there is a problem with their deployment, they can be separated from the spacecraft from within. Subsequent to that, why we continued our tests, both at Houston and at Langley, and recently which revealed today in our L minus 1 meeting, we have had some problem in packing the material that we would prefer on the parasol device. So, as a result of that, we are continuing with the original parasol with the original material, and Langley is delivering its device here, and we will have them both here this evening. We expect to make a decision later today to whether or not to stick with our original sequence - namely, parasol with, as a backup, the two pole shield and a backup to that ... or whether or not we wish to change the order and go two pole first, or whether or not we wish to change out and use the inflatable device instead of a parasol or any other combination. We have room on board the spacecraft for three devices -

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SPEAKER ... we have room onboard the spacecraft for three devices. We can delay packing - stowing the spacecraft and do intend to delay the stowage of the spacecraft until later tonight and Mr. Kapryan can answer any questions on that. That is an open issue; we do have all the data coming in; we do have all the flight articles coming in and we do have all of the proper tools for the decision coming here and we expect to review that again later in the day. The crews are trained on all the devices. We have no worries in that area. All of the devices work to one degree or another. All of the devices have a draw back to one degree or another and we are trading those off. However we - with the preoptions available to us we are very confident that when we do get up there we will be able to deploy a shield, we will get the spacecraft temperatures back under control, and we will have a good 28 day mission. The mission that has been described for us, the one we are planning for with our primary mode as I discussed before assuming we are able to deploy from internal to the spacecraft does call for beginning our experiment activities - I believe it's on day 5. Our plans are then to continue with almost a full load of all experiments. It does not look as if under nominal conditions if we had nothing additional go wrong, does not look as if we would have to curtail many of the experiments. Although in order to get these devices onboard the command service module we were forced to make some changes to the stowage. As we've previously reported you, the two experiments that were scheduled to go out the solar scientific airlock have been deleted because we cannot accommodate them. They cannot go out and see the Sun. We also were forced to take off a biomedical experiment. One - I've forgotten the name of it, it's called S015 and it has to do with zero gravity effects on human cells. We took that out for both weight and volume - because of the weight and volume considerations and also electrical power. We left off one of the materials processing in space experiments. We still have a great number of them onboard. The one that has to do with crystal growth, and that was deleted because it is a large - a consumer of large amounts of power and we did not feel we had that power available to us. We will save those two latter experiments and we have hopes that we'll be able to carry them both up on Skylab 3 or Skylab 4. I guess - Today we had a review of our readiness for launch and all of the forces are in place. All of our activities are on schedule here at the Cape. And we're preceding full speed for a launch at 9:00 tomorrow morning with Skylab II. Thank you.

SPEAKER Col. Vette can you give us an update on recovery forces?

SPEAKER Okay, we were ready to go on the first launch as we told you then and since then we have partially withdrawn some of th[illegible] forces during the stand-down period or the slip period. H[illegible], we have again deployed those forces and they are position now around the world. The force of people that activate the ROCR, the recovery operations control room in Houston, will arrive in Houston tonight. We'll have that in full force and fully activated tomorrow. In fact the slipped launch date has given us an opportunity tc provide some more capability in covering this mission in the form of ARIA aircraft. We are not going to provide an additional ARIA to cover the vents that take place during the docking and first days activity. In other words, we're ready to go are so are the mission.

SPEAKER Go ahead and start back there.

QUERY For Mr. Schneider, what sort of consideration go into these choices you have yet to reach with respect to the order of priority. Who has to argue with whom now, and then how long might it take? And A, as a subjective sort of thing I suppose. Is there some pride of authorship in the orgin of these various mods that has come into this discussion in any way?

SCHNEIDER Let me take the easy part first. This is a NASA team, I have never seen any organization I've ever worked with before that has worked parochialism. Our teams are working hand in glove. When we say something is being done at Houston for example, that means that the people from Marshall are there, there are people from various contractors there, there are people from Langley there. When we say there are things going on at Marshall the same is true. We do have technical people in various centers and we - they do have technical discussions. There's no denying that. There is no "we-they" that I've been able to detect anywhere in the system. Now as far as how the decision will be made, we will be trading off the various pluses and minuses. The parasol, the minus on the parasol is a lack of full proof that the material will last for 90 days. That's proof there are technical opinions and good techincal opinions that it will last. There is no proof, no experimental proof that that material will last. The two pole thermal shield - we're confident that that material will work. There's no controversy there. It requires a extravehicular activity. And that makes - that puts another day in the activation because we would delay

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- - we would not do EVA in the same day we would do the internal - the internal deployment. We have no problem with the EVA other than we would like not to do it if at all possible. The standup EVA - well we've all concluded that that is one that - has a reasonable chance of going in case we have to do it to backup. Reasonably certain we can do that. It has as a potential problem, in the event of a non-nominal deployment, you could conceivably make the solar panel, the ATM solar panel, contaminated and reduce the electrical power. The Langley inflatable device; the problem with that is that that's a very difficult one to deploy in a 1g field and to have assurance that it will deploy in zero g. So those are the minuses on them. The pluses on them which maybe I should have said first - the parasol is done from internal and that's very nice. The crew can get in there and can turn it on and everything is done right away. It's just very quick. The two pole thermal shield means that they would have to enter - I forgot to say that they would have to enter the spacecraft before we had a thermal shield on. We don't consider that to be a problem other than it'll be warm. Expecting the temperature in there to be around 110 I believe. Not above data time temperatures. As an advantage for this one as I said, the crew works in EVA stations that they have previously trained in and it seems like a pretty simple EVA task. The crew - if I remember the numbers correctly is something like an hour and a half or two hours in the water tank to deploy it. So --

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SPEAKER If I remember the numbers correctly, it's something like 1-1/2 to 2 hours in the water tank to deploy it, so it seemed like a reasonably - The SEVA one again, that looks like one that has as its plus, the fact that we can do that before we enter the spacecraft at all, we can get that deployed. And the command module is a very responsive vehicle. It's very controllable and the crew feels that they can maneuver it in just where they want. So, those are the pluses and minsus that will be weighed, and we'll have to do that later today.

SPEAKER (Inaudible)

SPEAKER It sounds like a bunch of questions, but really it's two, Bill Schneider and Mr. Kapryan, and they're all related. What airplanes have you got? What time are they leaving Langley and Houston? What time do you expect them here? And how is that going to conflict with anything that Kappy's got working on the launch pad?

SPEAKER Well, let me just say that as far as timing is concerned, I'll tell you as I understand it at this minute, but if it happens a little earlier or a little later, don't quote me. First, we're delivering them here as soon as possible. It looks as if the "soon as possible" on the Langley device will be to get it here about 4 o'clock this afternoon. Mr. Kleinknecht might correct me, but I believe we think we can get the parasol here at something like 8 o'clock this evening. Again, this is assuming things go very well. The SEVA sail is expected to be here, I believe, about 10 o'clock tonight. And I believe the two pole thermal shield is already here. And as far as what that does to Kappy, I'll have to ask Kappy.

KAPRYAN Well, what we've done in order to accommodate as late as possible an arrival of this equipment, we decided, couple of hours ago, to move the launch vehicle propellant loading up 3 hours. We will start flowing LOX into the bird at 9:45 tonight, rather than at 12:45 tomorrow morning. We will go ahead with the hydrogen as well as the oxygen. Should everything go per schedule, we'll be finished with that operation shortly before 1 o'clock in the morning. We will then have the 1-hour builtin hold, and a total amount of something on the order of between 4 and 5 hours available to us to go in there and do the complete stowage operation. As you probably know, the device that gets deployed through the scientific airlock is stowed in the T027 container. And this is a device that's about 10 inches by 10 inches by 61 inches long, and we cannot stow that with the center couch in; so we will have to delay the installation of the center couch until after we get the T027 device installed, whichever one that is. Since that's a fairly bulky item and comes quite close to panels in the spacecraft, we are not going to set our switches - final switch positions until after we do this stowage. So, we can accept it as late - the equipment, as late as 1 o'clock in the morning.

QUERY Well, I had earlier a different question, but I'll - I'd like to follow up on this one. After the Apollo 1 fire, it struck me that had everyone here said that mission rules and operations down here were tightened up and the whole of the manned operations were really tightened up a major way, and now it seems that, in order to get this up by 9 o'clock tomorrow morning, we're bending mission rules and we're just bending every rule on site. And I was wondering whether this is just an observation on my part or is it true?

KAPRYAN That's just an observation on your part. We have - seriously, we certainly worry about the same thing. We did hold a design certification review yesterday on all of these devices. We did look at all such things as the safety of the devices, we looked at the mission rules on how to use them, we have - any materials that are non standard have been examined to see if they are waiverable, and they have been. We have done outgassing tests to assure ourselves that there are no products left in the command and service module. We don't think that we have compromised our basic philosophies of doing things. In some cases, the things like the Langley sail and, perhaps, the parasol as well, our paper work isn't as exacting or as complete as you would expect on a normal development over a period of months. However, in those cases, we are shipping the people here, with the device, so that they can certify them in person. Normally, as you know, - and we have paper that certifies our devices. We do not think that we've compromised that in any way. We have been trying very hard not to. And I do not know of any case where we've done that.

QUERY Could I just follow that up and ask Deke whether he's satisfied with everything that's happened from the safety standpoint.

SLAYTON You certainly can, and the answer is yes. I think - as Bill said, we've taken a very thorough review of this whole thing, and we think we're ready to fly. I think the thing that Bill's talking about - making any procedures on and some compromises - are none of them in a safety area at all. These are things the worse that can happen (garbled)

QUERY How long does the parasol take?

PAO Can you hold? I understand Mr. Kleinnecht has an observation on that same question if we can let - can he talk? Can he?

SPEAKER Okay, I'd like to say something, Bill, about the paper work associated with the hardware. We certainly don't have as many pounds of paper work as if

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we'd been working on this hardware for a year or so, but we have in no way compromised the paper work. We have a complete set of manufacturing drawings for all of the hardware that's been built in the last 2 weeks. It has had in-process inspection as it was being built. It has been qualified by either tests or analysis just like any other hardware that goes on the vehicle. We've also had nonmetalic materials and materials reviews and it's just in no way any compromise. We've completely accomplished the intent of the certification and the qualification for flight hardware.

QUERY How long does it take to deploy the parasol and it will be hot in there, won't it? And what - how many guys are going to go in to do that, when are they going to go in, and what will they be wearing? Shirtsleeves, gloves, etc.

PAO Somebody like Deke to answer that one.

SLAYTON Well, to begin with it's going to be two guys, the commander and the pilot, and we haven't decided yet whether we're going in shirt sleeves or with LCGs, although we co go in with LCGs if we're really concerned about it, but I don't think we are. The temperatures as they are running now are what you'd get somewhat acclimated to in Houston and a few other places around the world, so we're not too concerned about that. The time involved looks like about an hour for both of these devices, although I think we have a better hack on the timelines for the parasail than we do for the inflatable ones, but I think they run, for the times we've run them, deploy the tripod, unstow the things necessary etc., probably in the ball park of an hour.

QUERY It's been observed that the temperature here is about like what they might experience.

QUERY I have several questions for Bill Schneider. I'd like to know how much, in terms of weight, has been taken out of the spacecraft, how much you contemplate putting in, what the spacecraft will weigh, and is this the heaviest (garbled). For Dr. Hawkins I want to know if the food, the chance of spoilage, what's the work load of the astronauts, plus other factors, how that will impact your medical experiments, and from Deke how the crew is viewing their additional responsibilities and work load.

SPEAKER Okay, let me start off by saying I think the weight increment is about 20 pounds or let me bounce it to Glynn Lunney who can tell you what the weight is in and what the weight is out. Glynn.

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SPEAKER Overall we've added about 400 pounds to the spacecraft lift-off weight; about 180 of that is in the command module, and 220 of it is in the service module in the increase cryogenics. I haven't gone back and looked at the numbers, but I expect this is one of the heaviest spacecrafts, CSMs, that we have flown. Lift-off weight now for the command module is 13,364.

SPEAKER Ask could you repeat the first part of the answer.

SPEAKER We've added about a total of 400 pounds net weight from what we would have lifted off 10 days ago. About 180 of that is in the command module and about 220 of it is in the service module where we have filled the cryogenic tanks.

SPEAKER If I remember exactly what you were asking, you were asking about the food, the heat, and the work load and how this affects the medical experiments. Right? Okay. We've been running, as you probably know from reports that have been passed out, that we have tested the food, been testing them under the conditions that we think the foods on board the craft are seen. Now we've put these under fairly severe tests, and our test data to date shows that the food is good. We do not expect, then, that we will have lost any of the nutritive value of the food, and, therefore, this would not affect the results of the experiment. The heat certainly can influence the result that you get in the medical experiments. These are performed at anything over 90 degrees is that the results no doubt will be affected, and we will have to evaluate that in light of what temperature profiles the experiments are conducted. Workload again is something that we don't really expect to see anything different than what we will have experienced under the nominal mission.

QUERY John, is that the truth then about it all?

SPEAKER Well, this shouldn't say that it's not going to be more difficult than a nominal mission, because it is. We have gor to go up there and do a fly around, and, assuming everything looks good, we hope to go out and to clear the SAS. But on the other hand I think we know how to do this, and it certainly ... probably be a couple of hours on launch date, but we don't look at this as being any real big deal. I think we're trained to do it properly, and we certainly don't intend to try any heroic measures at all to get that thing out. If it comes easily, we'll get it, and if it doesn't, we won't.

QUERY Conrad's responsibility is obviously much more responsibility for the crew for doing this.

SPEAKER Well, I think that's primarily a judgmental thing - he's going to be on the spot and obviously can evaluate

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it better than any of us can from down here watching it on TV, assuming we get it on TV. I don't think there's any other way to do the job except - which is not abnormal to what weather activities we do.

QUERY To Bill Schneider. The circumstances surrounding the return of the SEVA sail back to Houston after it already had been here, one flight model and one training model, as I understand, and was this for ultraviolet protection treatment?

SCHNEIDER Just as I stated earlier as part of what we concluded yesterday, we did not have technical certainty that the material would last the 90 days, and we would very much prefer to have a material up there that lasted 90 days. At least 90 days. I'd like to have it last the full 8 months. One of the things that it was possible for us to do was to take that SEVA sail and send it back to Houston and put some protective coating on the SEVA sail and return it here to the Cape, and those actions were taken at that time.

QUERY Bill Schneider. I'm a little confused about the materials used in the three most preferred fixtures - the parasol, the twin pole concept, and the sail. Are not all those devices made of the laminated Mylar aluminum nylon? Why are only one or two of them being covered with foral, or do I misunderstand that? And the second question deals with experiments. I believe earlier you said that it looked now as though the experiments would not have to be curtailed very much. Could you elaborate on that?

SCHNEIDER Okay. If I remember correctly, the basic materials on these three devices are all the same basic material, and it's how the nylon surface which faces the Sun is treated. In the parasol, that is currently in an untreated condition. In the two pole thermal shield, that will have the S13G paint on, which is the paint that we had on the side of the orbital workshop before we lost the thermal shield. I understand it is on those portions that remain painted. The SEVA material - we started out we were going to paint it with a titanium paint and then made the decision - one of those was getting titanium paint on it, and the other one is being coated with (can you help me) Kapton.

SPEAKER Kapton, 1/2 mil thick.

SCHNEIDER Let's see, the mission, the experiments - the experiments right now are firming. During the time when the CSM is there, we have great amounts of electrical power, and we believe we'll be able to run a full mission. There is always the possibility that we might lose a battery on the ATM, which would make us revise our estimate. But right now, while the CSM is powered up, we think we'll have more than adequate electrical power to do the mission as planned, essentially. After the CSM power is down, if we are not yet in the high beta angles, we will have to probably reduce some of our experiment activities, depending upon exactly how much excess power we have. If we're as successful as we believe in keeping the CSM powered up for a long period, on the order of 20, 23 days, and if we have no problems with the ATM, and if the ATM continues to put out electrical power the way it has been, we expect to be in the high beta angle regime about the same time when we'll be in full sunlight. We'll be in sulight for the full orbit duration, get out of the Earth's shadow. And at that time the ATM solar panels being in the sun at full all the time, we should produce something on the order of a little over 7000 watts, which is more than enough to do the full experiment load.

QUERY Can I follow that up briefly? Does that mean, in regards to the shade, that they are no longer orange on the side facing the Sun?

SCHNEIDER The parasol device is orange. The S13G paint - I don't know whether that's black or white; it's one of the two, and the Kapton I believe is gold colored. Is that correct?

SPEAKER Yes. Yes, it's gold.

QUERY And the experiments, when you say a full mission you mean simultaneous operation of experiments, no difference whatsoever from the -

SCHNEIDER I'm not going to guarantee that until we get up there. Our early indications are that we can and will have enough electrical power to do that. We're liable to get up there and find that things are different than we expect, and we have to have more heaters on or something like that, which will put a higher drain on our power. We think it'll be good. We think we'll have enough power.

QUERY Bill, speaking in terms of percentages, with any or a combination of your three thermal devices, what kind of protection is possible compared with 100 percent for the late micrometeoroid thermal shield?

SCHNEIDER You talk about micrometeoroid protection? Thermal protection or micrometeoroid protection? Thermal Protection?

SCHNEIDER If we get these devices up within about two days, we should be down around 80 degrees, and it will go down, continue on down, and at the high beta angles, we think we'll have to turn on heaters to keep us warm. Skylab was ... cold deliberately when we designed it, so that we had planned on having a cold temperature and heating up. And go to the high beta angles, we anticipate that we'll get into that case. I believe the temperatures that we're anticipating are probably in the 60 to 70 degree range or -

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SPEAKER ...believe the temperatures that we're anticipating are probably in - in the 60 to 70 degree range, although I'll hasten to add they're theoretical calculations using the computer as a model and it's liable to be plus or minus a few degrees on that.

QUERY At what point tonight do you reach the absolute GO/NO GO point?

SPEAKER When the captain gets to stowage.

QUERY What is the time on that?

SPEAKER That will probably be around midnight when he finally gets it stowed. We hope to have - we hope to be telling them what to stow before that.

QUERY Okay, in other words, at midnight we will have an idea of whether we have to go out to the thing tomorrow or not. (Laughter) Is that it?

SPEAKER Well I'm going to go to bed earlier than that. I'm going to assume that we are going out. Let me be real clear on that. We're reasonably certain that we are going tomorrow. There's always a possibility that we might change our mind and if so we certainly will let you know as soon as that decision is reached. Right now we are GO and the only uncertainty is which one of these devices we're going to say is the prime device.

QUERY What is the latest hour that you can launch - or that you can stow this equipment and still make the launch time?

SPEAKER Well, we're planning to do the stowage starting at 1 o'clock in the morning. We could probably if necessary, and if everything is going well, probably delay that another two hours.

QUERY Two quick questions, you seem to be implying when you talk about 90 days usefulness of the shield that if we want to go fly the next two Skylabs we got to go up and deploy some more thermal shields. And another question I had was whether - what if any changes in the rescue mission has been made by this delay or maybe none.

SPEAKER Let me start out by saying that we would like very much - and the two pole thermal shield for example, and the SEVA with its protection - we expect would last the full duration of Skylab. The parasol - there's a technical uncertainty about how - just how long that would last. If we end up using that we would probably do some additional testing on the ground and probably also in flight to make a real time decision whether to eject it before the end of the mission and deploy a thermal shield or something like that. The Langley inflatable device appears to have - from a thermal standpoint - appears to have a capability of lasting the full duration. It requires no pressure to inflate it. And then it has some history to it as to what should keep it in position. But we have an uncertainty as to whether or not the TACS firings or anything like that might cause it to fold up and thus reduce its thermal efficiency, which might mean then also that ... if we use it might be a candidate for ejection if, and again I hasten to emphasize the word might be a candicate for ejection if the thermal conditions indicate that something has happened to it.

QUERY What about the rescue ...

SPEAKER The rescue thing? We're processing the vehicle as - as planned. The SL-3 if in the event we require a rescue why the crew would remain in the airlock MDA. They do have access to the food onboard. And they would stay there until we get the rescue vehicle up there.

QUERY We had, before we started the whole thing here, a rescue mission. A standard nominal rescue mission so that if something happened to the CSM when it docked. Now has that basic plan been changed at all?

SPEAKER No sir.

QUERY A time line or anything else?

SPEAKER No sir.

QUERY Two questions for Mr. Schneider, if all these things don't come together and you miss the launch time tomorrow, what are you looking at for the next possible launch? And could you give an estimate of how many people have been involved in building these fixes and their possible cost?

SPEAKER OKay, as far as the launch windows go from a straight ... mechanics standpoint we have a M=20 window on Saturday and the windows move forward I believe 24 minutes a day. And then an M=19 window on Sunday and another M=19 window on Monday and Tuesday and then we're back to an M=5 window on Wednesday. We would like very much to have an M=5 rendezvous but we have not ruled out an M=20. We believe based on the way the situation is unfolding right now that if we missed tomorrow we would go for an M=20 window on Saturday and then we would make a real time decision if we missed that and go on Sunday. We probably, unless there was a real urgent reason for going up, we probably would recycle to next Wendesdays window and M=5. Although we can indeed as I said go with it. As far as how many people been working on the devices except for the people at Langley I can't really say that. But people who been working on the primary devices - Houston and Marshall and with their contractors they've all been the same people we would have normally had. They have been putting in a lot of overtime. There have been a number of devices other than those that we have mentioned here that have been made by, if you will non - non Skylab people, but they - some of them worked for Dick Smith and they're the same kind of people. We haven't added anybody on the payroll. We've had devices submitted by Boeing, by North American Seal Beach, by Aerospace Corporation, By North - by Douglas - McDonnell Douglas St. Louis and I've probably forgotten a few people and if I have please forgive me. So, mostly it's been a case of a lot of volunteer work and a lot of overtime work. We have not hired on a lot of new people though. The Langley device has been done in Langley by the Langley people. That's been primarily done in house and it too has been a product of much overtime and volunteer work on the part of people. I have no estimate of the what the cost is. We're not - we do not predict in any way that this will have any effect on the Skylab - any significant effect on the Skylab runout cost. Since we had in our original plan a capability to recycle for a few days on the SL-2, we had previously funded as if that might be a case.

SPEAKER We'll take one more here and then we'll go to your colleagues in Houston and give them a shot at it.

QUERY What is the technical uncertainty involved here? Why are you afraid that it might not last 90 days? Is it going to come apart? What's going to happen?

SPEAKER Well, there is a - I ought to have some materials people to explain this better than I but, some types of nylon when exposed to the thermal ultraviolet environment change their characteristic and there is some evidence that they lose their strength. Now that's not conclusive evidence by any stretch of the imagination. And there are some bodies of technical opinion that say that that does not go on as some of the samples have indicated it will. But we think that maybe it levels out and does not continue in the same manner. The uncertainty is whether or not the nylon side will last the full 8 months and if it does not --

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SPEAKER The uncertainty is whether or not the Nylon side will last the full 8 months and if it does not why then we would lose our thermal shield. The Nylon would go and then the Dacron would go and we'd lose the whole shield. You'd lose that part of the shield.

SPEAKER Pardon?

SPEAKER Because of the packing problem we tried to treat it last night and as I said we between last night and this morning why we were unable to get the treatment on the surface that we had decided upon last night so we will ship the device here without any treatment on the orange side.

PAO Okay. We'll start up here and then work our way back and around.

QUERY I'd like to start with a question, Ken, here, back to the shipment of the parasol and sail. Those times that Schneider was giving are way off from what we've been getting here. When can we expect they'll be shipped and are they going to go together or not?

KLEINKNECHT They are going to go together. We may be a little more optimistic than Bill is. The parasol should be being packed now. We expect we're going to have it ready to leave by 4 o'clock and don't hold me to that number either because if I wasn't optimistic and if we weren't working towards a very ambitious schedule I think we'd be remiss. But it will be shipped by Lear jet. It will not fit in the pod for a T38. We have a Lear jet standing by. The SEVA sail is in the process of having Kapton put on it now. We expect it to be ready at about 4 o'clock. It'll go by T38.

QUERY The other part of that is why wasn't the sail treated to begin with? I remember when it was first being developed across the street at GE I was told at that time there would be a coating put on it of some nature to help protect the Nylon side and then all of a sudden we found out it's not going to be.

KLEINKNECHT The first prototype we built did have the white paint - white fluorel type titanium oxide paint. There is a lack of knowledge on that although analytically that should be good paint. We do not have a lot of data on that either. It became a time when we were working for a device that was good for 30 days with the best materials we had, make it as light as possible, and we believe that the Nylon and we still believe and I don't think there's any controversy over whether the Nylon would be good for 30 days or not. It is a matter of the rate of deterioration of strength. Whether it levels off. It certainly does - strength does deteriorate. However, on the other hand there is some uncertainty in the loads that you would have up there. We believe once it's deployed there's essentially no loads on it with exception of some effect of TACS jet impingement.

QUERY The last edition of Newsweek stated that it was highly controversial whether to use this kind of micrometeoroid shield you used in this mission. Two questions, is this correct? And the second question, what led you to this decision to use it inspite of this controversy if there was one?

SPEAKER I'm not aware of any controversy. And this shield is not a micrometeoroid shield we're putting on, although it does provide some micrometeoroid protection. We are putting on a thermal protective shield. That's -

QUERY Inaudible.

SPEAKER I'd send that question back to the Cape for Lee Belew.

SPEAKER Lee isn't here but let me try it, Ken. Lee's working the inflatable device problem this afternoon. There is no controversy as far as whether or not that device should be put on. We had a - we had a program requirement to provide a .995 probability of mission success and I emphasize mission success, not crew safety. Crew safety is much, much higher than that. A .995 probability of mission success was our original criteria. In order to assure that number with the models that were available as to what the micrometeoroid penetration would be, it didn't indicate that we needed a thermal shield - I mean a micrometeoroid shield. This was done - was put on and we ended up with the shield that has subsequently departed. The analysis today using this same model says that our mission goes a full 240 day mission - goes down to .954 for full mission success. For crew safety if I remember my numbers right it's .99999998. I may be off on the last number.

QUERY Have all the materials been checked for flammability that are going into the CSM? Glynn you might be able to answer that.

LUNNEY Yes we have. We've been very careful in all the materials that have been selected and have been looked at. There have been 1 or 2 cases where we have had to add equipment that would not pass the rigid specifications that we have but we have been willing to accept them on the basis of stowing them in bags and only taking them out for limited use and then putting them back in bags et cetera. For example, the smoke masks that were added onboard.

QUERY One more, please. Bill Schneider. I'm a little confused over this power situation. I think you led us to believe that you would be drawing power from the CSM

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batteries when you're going up there and that contradicts something I heard earlier. As I understand all you're going to do is power down the CSM in order to make it last 20 or 23 days, draw something like 4200 to 5000 watts from the ATM of which 3000 watts are going to be for housekeeping alone. The remaining is not going to allow you to do full experimentation full time, is it?

SCHNEIDER To clarify the first portion and I suggest Glynn Lunney might be able to amplify it later. When we powered down the command service module it requires about 1000 watts and Glynn can provide the exact number to keep the heaters going, to keep the communications equipment working and things like that. As long as the CSM fuel cells are operating we will provide that power from the CSM fuel cells. When the fuel cells run out of cryogenics that power must be provided from the orbiting workshop, the ATM solar array. At that time then our available power is reduced by that power which we must then supply to the CSM. So you are correct. We were not tapping power from the CSM to do experiments but by having that CSM power for CSM requirements it made available to us additional power. Now I don't recall the numbers again - I don't remember the numbers that you said but let me state again, as the beta angle changes we get more and more electrical power out of the ATM solar array. And I believe on day 24 we expect that the solar arrays will be in full sunlight and we will get 7000 watts or possibly even more out of those solar arrays the full 24 hours a day which is more than enough to do our full experiment compliment. So if the CSM remains powered up as much as we hope, not as much as we expect, as much as we hope, we will just about run out of CSM power about the time we get into -

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QUERY If the CSM remains powered up for as much as we hope, not as much as we expect, but as much as we hope, we will just about run out of CSM power about the time we get into the high beta angle. If the CSM does not hold up that long and the fuel cell is depleted earlier, why then we would have to curtail some of our experiments, and we would - we cannot say how much until we see exactly what our power usage is up there and what our power generation is when we get remaining in full solar inertial. We believe, at present, that we'll be able to run a full complement of experiments.

PAO Roy Neal.

QUERY I wonder if you can give us some kind of a hack at what your proposed timelines would be for these various systems of deployment, and, perhaps even more important, what are your television plans, both for the systems of deployment and a little later on?

SPEAKER Deke, you'd better talk about timelines and maybe -

SLAYTON You talk about television. I don't want to talk about that. Okay, timelines. The parasol, we would go in on the - well, number one, the first day we planning to go up, do a fly around, hopefully deploy the SAS panels, and redock. That's the end of that day. The second day we will then go in and activate the workshop partially and deploy the umbrella mechanism, assuming that's our first choice and assuming that works. If that does not work, of course, then we have to fall back on our next choice, which will probably be the fold sail, and that would have to go up the following day, or the third day. Assuming our first choice works, however, we would continue workshop activation on the third day, complete it on the fourth, and begin orbital operations and be up and running full ... on the fifth day. Is that what you were - if you're looking for the timeline on the deployment of each of these, I think I indicated earlier we look like an hour approximately on the airlock deployed one. We look for about 3 hours on the EVA deployed one. As Bill indicated earlier, we have deployed it in 2 hours. However, remember we're going around the earth now, and we hit a couple of night-side passes there, and we don't want to be working in the dark. So we'll be closer through a one night-side pass at least and going in the daylight. So the probable timeline on that would run about 3 hours. As far as the SEVA-deployed sail is concerned, we don't have a real good hack on that, because it's very difficult to simulate. It would involve, however, undocking, pressurize the suits, opening the hatch, and if you want my guess, it would be in the neighborhood of 1 hour to accomplish that. But I surely wouldn't want to be commited to that one guarantee.

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SPEAKER As far as the TV's concerned, Roy, at present, assuming we lift-off on schedule, we expect to be able to pick up television at Guam on the station-keeping, much the same as you've previously heard, and we should see a good view of the spacecraft through the window. As you remember, we have no record capability in the CSM. Then we pick up - we continue after we lose Guam when we pick up Goldstone, and we expect about 5 minutes at Guam. And then at Goldstone, we pick up, I believe they said yesterday, about 17 minutes of TV, at which time we expect to be doing the flyaround inspection. Beyond that, we expect to be off the range, and we do not expect any TV of any of the deployment. For example, if we had to go on and do EVA, we have no TV camera for, say, the second option, the two-pole thermal shield. We have no TV camera that would give us good EVA pictures. As you recall, the TV camera had previously been planned to be deployed out the scientific airlock, and, of course, that option would not be available to us. Okay?

QUERY I have two questions: one for me and one relayed from New York. You've been making many changes in the last several days on the various fix possibilities. How can you say with certainty that the material will last even 90 days? Has anything been tested that long? Are you extrapolating? How do you reach that conclusion? The second thing is, as a result of the added load in the command module, will there be any changes whatever in the launch sequence?

SPEAKER The first question. Yes, we have done tests, performed tests on all of these materials. Obviously, we do not have a 90 day test. There is some extrapolation. However, we know something about the basic materials. We have reviewed some of the materials that have been used on Surveyor and other space vehicles, and it's our judgment that the materials would be good for 90 days and, in fact, probably the duration of the mission, with the exception of some uncertainty on the nylon.

LUNNEY Relative to the launch sequence, I'm not sure I know specifically what you might be referring to, but I can't think of any difference. The added weight makes some difference to the trajectory, but that would not be noticeable. I think that the timing of events will be essentially the same.

QUERY You can appreciate these men have a lot to do between now and 9:00; so we're going to have to cut the press conference off here. Thank you very much, gentlemen.

END OF TAPE